JRC SCIENTIFIC AND POLICY REPORTS

The Economic Performance of the EU Aquaculture Sector – 2012 exercise (STECF-13-03)

Scientific, Technical and Economic Committee for Fisheries (STECF)

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This report was reviewed by the STECF during its' 42nd plenary meeting held from 8 to 12 April 2013 in Brussels, Belgium

Report EUR 25975 EN

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JRC 81620

EUR 25975 EN

ISBN 978-92-79-29909-4

ISSN 1831-9424

doi:10.2788/90296

Luxembourg: Publications Office of the European Union, 2013

How to cite this report:

Scientific, Technical and Economic Committee for Fisheries (STECF) – The Economic Performance of the EU Aquaculture Sector - 2012 exercise (STECF-13-03). 2013. Publications Office of the European Union, Luxembourg, EUR 25975 EN, JRC 81620, 237 pp.

Printed in Italy

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THE ECONOMIC PERFORMANCE OF THE EU AQUACULTURE SECTOR – 2012 EXERCISE (STECF 13-03)

THIS REPORT WAS REVIEWED DURING THE PLENARY MEETING HELD IN BRUSSELS

8-12 APRIL 2013

Request to the STECF

STECF is requested to review and adopt the final aquaculture report of the STECF EWG 12-13 held in Ispra, 24-28 September 2012, evaluate the findings and make any appropriate comments and recommendations.

Background

The purpose of the EWG 12-13 was to produce the 2012 Economic Report on the Economic Performance of the EU Aquaculture sector.

The preliminary findings of STECF EWG 12-13 were presented to the November 2012 plenary meeting of the STECF (PLEN 12-03). At that time the EWG 12-13 report was incomplete largely because the STECF EWG 12-13 was held only 2 weeks previously. The EWG 12-13 report has now been finalised and the text below reflects the STECF review of the report.

Overview

The Expert Working Group 12-13 convened in September 2012 in Ispra (Italy), to produce a report on the Economic Performance of the European Union Aquaculture sector in 2012. The report represents the combined efforts of 18 external experts and 7 experts of JRC that participated in the EWG meeting, and an additional by 3 other experts who participated via email.

This is the second report of this type to show the performance of the aquaculture sector and provides an overview of the latest available information on the structure, social, economic and competitive performance of the aquaculture sector at national and EU level. The data used in this publication relates from 2008 to 2010, and was collected under the Data Collection Framework (DCF).

The DCF regulation only requires the collection of data on aquaculture of marine species while the collection of freshwater aquaculture is voluntary. Therefore, the DCF data collection is only applied to the 22 EU's coastal Member States. Belgium, Latvia and Lithuania provided no data because most of their aquaculture production is freshwater based. Germany, Poland and Slovenia submitted marine water aquaculture data, but not on the freshwater aquaculture. The Netherlands only provided data for 2008 and 2009, Greece did not provide any data in this data call, and Italian data reported refer to a sample of the total Italian aquaculture production, and consequently these data could not be used in this exercise.

The report includes an EU overview chapter, containing a section on the interactions between fisheries and aquaculture (from an economic and environmental point of view) followed by an analysis of the structure of the sector and its subsectors (shellfish, marine and freshwater). Then the report provides the 27 national chapters (chapter related to landlocked countries have been drafted based on FAO data). Finally, it includes a glossary, a list of references used and the Appendices (including the review of the TORs for the DCF workshop on aquaculture and the Evaluation of the European Aquaculture Performance Indicators (EAPI).

STECF OBSERVATIONS

STECF notes that globally the role of aquaculture as contributor to socio-economic development, food supply and food security is constantly increasing and is predicted to increase further. Worldwide aquaculture production is increasing significantly: FAO estimates than by year 2030, 65% of all seafood consumption will come from aquaculture. However, the EU (27) aquaculture production, according to the report and based on FAO data, represents only 1.6 % of the world aquaculture production in volume and 3.3 % in value. Furthermore, the EU (27) contribution to world aquaculture production has been decreasing significantly over time.

STECF also notes that, according to the report, the EU aquaculture production has been more or less stable from the late 1990s onwards. The share of aquaculture as a proportion of the total EU seafood production increased from less than 10% in the late 1980's, but has remained relatively stable at 15-16 % of the EU seafood production since the mid 2000s. The relative increase was mainly due to the decrease in marine capture fisheries.

STECF also observes that while on a global level freshwater and marine aquaculture production volumes are quite similar, in Europe marine aquaculture predominates, both in volume and value. EU aquaculture production is mainly concentrated in 5 countries: France, Greece, Italy, Spain and the United Kingdom.

STECF notes that according to the report, data for 2010 show an improvement in the economic performance of the EU aquaculture sector from the beginning of the economic crisis (2008-2009). However, the future evolution of the EU aquaculture is rather uncertain. The aquaculture sector has to face fierce foreign competition that brings market prices down, high labour and capital costs and administrative burdens that slow down investments in the sector, hindering the full potential of the EU aquaculture sector.

STECF notes that data quality remains a problem for the compilation of the report. In the preparation of the meeting, coverage and quality checks were performed by JRC before the meeting, and if issues were found, MS were contacted and asked to check and validate the data, and resubmit when necessary. Most MS corrected and resubmitted the data, some providing further explanations on the data issues. Despite these preparatory activities further data issues were detected during the meeting which required further uploading activity during, as well as, after the meeting.

STECF observes that, according to the data coverage and quality chapter of the report, although there was some improvement in the quality of the data submitted compared to the previous call, there are still many issues with several parameters that Member States and others are working to improve.

In cases of missing or unreliable data arising from the DCF data call on the production volume and value, the analyses in the report have been based on data from FAO. STECF notes that while this approach is appropriate given the circumstances, it would be preferable to base such analyses on DCF data only since, FAO data are based on all aquaculture production destined for human consumption, while DCF data are based on all aquaculture production (for human-consumption and other) from companies whose main activity is aquaculture.

STECF notes that the economic data analysed represents about 70% of the production of the whole EU aquaculture sector. The main reasons for not achieving 100% coverage, as compared to FAO data, are that DCF data collection does not apply to EU landlocked countries, freshwater aquaculture is not compulsory in the DCF, Greece and Belgium did not submit any data for this data call, Netherlands did not submit data for

2010, and Italian data has not been used in the report because it refers to the sample units and not to the population.

STECF observes that the report of the STECF EWG 12-13 provides a review of the European Aquaculture Performance Indicators (EAPI), developed by JRC in support of DG MARE, aimed at identifying the relative starting positions and different circumstances in the Member States.

STECF observes that the EAPI study provides Member States with a) an instrument to draft the multiannual national strategic program – which will be established as it can be foreseen today by the new CFP; and b) assistance to progressively monitor the achievement of the goals foreseen in their national strategic program.

STECF CONCLUSIONS

STECF concludes that the EWG-12-13 adequately addressed all of its Terms of References. The EWG 12-13 report represents an enhancement of the report on the performance of the Aquaculture sector in 2011 and contains more detailed analyses.

STECF concludes that the use of different data sources (FAO and/or EUROSTAT) for completeness of information in cases where data were not submitted and for validation purposes has proven to be useful especially considering that the 2012 data call for aquaculture data was only the second of such calls.

Nevertheless, STECF notes that these different data sources are not always compatible, due to different reference population or to different disaggregation level but concludes that the possibility to harmonise data coming from the above sources would be desirable as would permit cross-check validation of data and, hence, provide a more comprehensive picture of aquaculture in the EU.

To this aim, STECF considers that it is important that the forthcoming meetings of the EWG 13-16 meeting on advising on the DC MAP and the PGECON, take into account the comments made in the report of the EWG 12-13 on the ToRs of the DCF aquaculture workshop held in November 2012. In particular the EWG 13-16 should take note of the following comments taken from the report of that meeting:

- evaluate the possibility to harmonise segmentation between DCF data collection and EUROSTAT request of data under Reg. No 762/2008 of 9 July 2008;
- take into account some EWG 12-13 comments on the revision of the list of economic variables to be collected under DCF as:

  a) include “livestock in weight and value of stocks”- stock at the end of the period - in order to know the stock variations;

  b) include subsidies for investments, considering they are very important for aquaculture enterprises and also their importance to track and evaluate the EFF - currently it is only asked for direct subsidies;

  c) consider to collect production data in terms of number of individuals, apart from currently reporting their weight and value. This makes sense for some segments, especially hatcheries and nurseries, since weight can change significantly in a short period.

STECF concludes that the EAPI indicators prepared by the JRC provide an appropriate complement to the economic performance analysis carried out by STECF.

REPORT TO THE STECF

EXPERT WORKING GROUP OF THE ECONOMIC PERFORMANCE OF THE EU AQUACULTURE SECTOR (EWG 12-13)

ISPRA, ITALY, 24-28 SEPTEMBER 2012

This report does not necessarily reflect the view of the STECF and the European Commission and in no way anticipates the Commission's future policy in this area.

1 EXECUTIVE SUMMARY

The purpose of the EWG 12-13 meeting was to produce the 2012 Economic Report on the Economic Performance of the EU Aquaculture sector. This is the second report of this type, after last year's report, produced for the aquaculture sector. This report provides a comprehensive overview of the latest information available on the structure, social, economic and competitive performance of the aquaculture sector at national and EU level. The data used in this publication relates from 2008 to 20010, and was collected under the Data Collection Framework (DCF). The report includes an EU overview chapter, detailed analysis by aquaculture subsector (i.e. shellfish, marine and freshwater aquaculture) and national chapters.

Europe represents the largest market for fish in the world. Over the past decades consumption has increased. However, as own production of fish (capture and farmed) has not increased, net fish imports have increased, and self sufficiency has decreased. There are many reasons that have lead to an increase in demand for fish. First, population size has increased. Second, overall the real price of fish has come down, making the product more attractive to consumers. Third, real incomes have increased, causing greater demand for fish. Finally, consumers have become more health conscious, causing a positive shift in demand as fish consumption is known to have important health benefits.

EU landings of wild fish have been stagnant or even decreasing; while EU aquaculture production has been stagnant. World aquaculture production is led by Asia with 91 % of the production in quantity and 81 % in value. In contrast, the EU-27 is only a minor player in aquaculture production. The EU (27) contribution to world aquaculture production has been decreasing significantly over time in both volume and value terms, representing 2 % and 3 % of global production in 2010. There are some successful stories in the EU aquaculture (STECF, 2012). However, overall, aquaculture in the European Union has not come up with new species that have "taken off" in the way that was the case, for example, for salmon in Norway and Chile or pangasius in Vietnam. There may be several reasons for that (some of them reviewed in STECF, 2012). Successful development of aquaculture presupposes control with the biological production process. Beyond that, what may be called economic sustainability, namely profitable production over time, is required. This depends not only on the "sale" price, but also on the cost of production. Considering the fierce competition (foreign but also internal) and high labour and capital costs that the EU aquaculture sector bears, high value species are most relevant for EU producers. More than that, in view of the high costs, species of interest are those where productivity improvements can be achieved over time, giving rise to lower costs of production. This is an absolute necessity, because as production expands, price is bound to come down. Moreover, governance takes on an important responsibility in the future of aquaculture. Positive important roles for governments include expediting the planning process for new farms (and farm extensions), as well as makings sites available. In addition, there is an important role for governments in terms of R&D.

Using DCF and FAO data, it has been estimated that the aquaculture sector production in the EU-27 accounted for 1.36 million tonnes, with a turnover estimated at 3.58 billion Euros, in 2010. Spain, with 20 % of the total EU production in volume, is the largest aquaculture producer in the EU, followed by France (18 %), United Kingdom (16 %), Italy (12 %) and Greece (9 %). These five countries account for 75 % of the total EU aquaculture production in weight. In terms of value, France is the largest EU producer with 21 % of the total EU aquaculture, followed by the United Kingdom (19 %), Spain (13 %), Greece (12 %) and Italy (11 %). These five countries are responsible for 76 % of all the EU aquaculture value.

On the DCF regulation concerning the aquaculture sector, the collection of freshwater aquaculture is voluntary, while marine aquaculture is compulsory. Therefore, the DCF data collection is only applied to the

22 EU's coastal Member States. The 5 landlocked Member States (Austria, Czech Republic, Hungary, Luxemburg and Slovakia) represented less than 3 % of the total EU aquaculture production in 2010. Moreover, Belgium, Latvia and Lithuania provided no data under the DCF because most of their aquaculture production is freshwater based. These Member States represented less than 1 % of the total EU aquaculture production in 2010. Germany, Poland and Slovenia submitted marine water aquaculture data, but not on the freshwater aquaculture. The unreported freshwater aquaculture production from these Member States accounted for 5 % of the EU aquaculture production in 2010. The Netherlands only provided data for 2008 and 2009. Missing 2010 Dutch aquaculture data represents 5 % in weight and 3 % in value of the EU aquaculture production. Greece did not provide any data in this data call. Greek aquaculture production is rather significant, representing 9 % in weight and 12 % in value of the EU aquaculture production. Even if Italy provided aquaculture data for the 3 years, the data reported refers to a sample of the total Italian aquaculture production, and consequently these data could not be used in this exercise. Italian aquaculture production is also significant, since it represents 12 % in weight and 11 % in value of the total EU aquaculture production. Moreover, still remain some data quality issues in the reported data.

Reported data suggest that in the EU (27) the total number of companies with aquaculture as their main activity is between 14 and 15 thousand in 2010, having produced a Gross Value Added of around 1.5 billion Euros in 2010. Available data confirms the profitability improvement in 2010, after two years of suffering losses. Profitability based on the Return On Investment calculated from the EBIT was 5.7 %. However, it must be noted that the economic performance and the productivity differed enormously across subsectors and segments. The cost structures of the different national segments are presented in detail in the national chapters; while the analysis by subsector (shellfish, marine and freshwater) is presented in chapter 5.

The EU aquaculture sector gave direct employment to more than 85,000 people in Europe, with an annual average wage of around 19,400 Euro. Women accounted for 29 % of these jobs. The large percentage of part-time work in the sector should be highlighted, as can be seen through comparison of the total employment numbers with employment expressed in Full Time Equivalents (FTE is 47 % of the total number of employees). Part-time employment is important in the shellfish and freshwater aquaculture subsectors.

Shellfish aquaculture is a labour intensive segment, which faces limited environmental concerns. This sector contributes actively to external trade and has a very important social dimension given the high number of employed persons. Total sales volume for the EU (27) aquaculture shellfish sector is estimated to be 0.72 million tonnes and the total value of sales (turnover) is estimated to be 1.12 billion Euros in 2010. The most important costs of the EU shellfish aquaculture sector are labour and livestock costs. A large part of the employment is not performed under a formal contract. The workers are either the owners of the company or family members.

Marine fish aquaculture is characterised by being generally capital intensive, with high input and high labour productivity. This segment has potential to compete on the increasingly globalised market but it faces constrains which hinder further expansion. Its environmental impacts are also generally higher than those of other aquaculture segments. The total sales volume for the EU (27) marine aquaculture sector is estimated to be 0.51 million tonnes and the total value of sales (turnover) is estimated to be 1.57 billion Euros in 2010.

Freshwater aquaculture is often characterized by low labour productivity and low capital intensity, serving mainly local markets (e.g. carp). In this category limited demand and strong international competition is limiting the profitability and growth of production, however the extensive and artisanal production may play a role in environmental and recreational aspects (e.g. regarding biodiversity and preserving cultural

landscapes). The total sales volume for the EU (27) freshwater aquaculture sector is estimated to be 0.31 million tonnes and the total value of sales (turnover) is estimated to be 0.91 billion Euros in 2010.

In 2010, the main aquaculture species produced in value terms in the EU (27) were mussels (471 thousand tonnes, 37 % of all production), rainbow trout (193 thousand tonnes, 15 % of all production), Atlantic salmon (171 thousand tonnes, 14 %), Pacific cupped oysters (104 thousand tonnes, 8 %), gilthead seabream (88 thousand tonnes, 7 %), common carp (66 thousand tonnes, 5 %) and European seabass (54 thousand tonnes, 4 %). This species constituted more than 90 % of the total EU aquaculture production. While the main aquaculture species produced in value in the EU (27) were Atlantic salmon (570 million Euros, 19 % of all EU production), rainbow trout (538 million Euros, 17 % of all EU production), mussels (402 million Euros, 13 %), gilthead seabream (358 million Euros, 12 %), Pacific cupped oysters (348 million Euros, 11 %), European seabass (276 million Euros, 9 %) and common carp (133 million Euros, 4 %). This species constituted more than 85 % of the total EU (27) aquaculture production in value for 2010.

National chapters for the 27 EU Members States are provided. For those countries where DCF data was not collected or not submitted, the national chapters were completed using FAO data. The report includes also a *Glossary* with definitions for all the variables collected as well as the indicators used in the analysis (together with their formulas), a *Review of the TORs for the DCF workshop on aquaculture* organized in November 2012, and a *Evaluation of the European Aquaculture Performance Indicators (EAPI)*. On request of DG MARE, the Joint Research Centre (JRC) has developed the EAPI, a set of indicators which are aimed to identify the starting positions and different circumstances in the Member States. The study explores 3 main aquaculture dimensions (economic, social, environmental) for a set of 12 indicator (Growth, Gross value added, Profitability, Labour productivity, Trade balance, Diversification, Employment, Apparent consumption, Fishmeal/Fish oil use, Nitrogen and Phosphorus Emission). The EAPI are based on statistical data and data from the aquaculture data call. The chosen performance indicators could also serve as a tool to make the results of the policy cooperation measurable. The production of the EAPI indicators can offer several benefits: (i) to provide the Member States with an instrument to draft the multiannual national strategic program, as established by the new CFP; (ii) to help the Member States to progressively monitor the achievement of the goals foreseen in their national strategic programs; and (iii) be a good tool to complement the analysis performed in the STECF aquaculture reports.

Data for 2010 show an improvement in the economic performance of the EU aquaculture sector from the beginning of the economic crisis (2008-2009). However, the future evolution of the EU aquaculture is rather uncertain. The aquaculture sector has to face a fierce foreign competition that brings market prices down, high labour and capital costs and administrative burdens that slow down investments in the sector, hindering the full potential of the EU aquaculture sector.

2 INTRODUCTION

The Expert Working Group 12-13 convened in September 2012 in Ispra (Italy), to produce the 2012 Economic Performance of the European Union Aquaculture sector report. This report reflects the work by 18 external experts and 7 experts of JRC that attended the meeting, but also work by 3 other external experts who participated via email.

This is the second report of this type, after last year's report, produced for the aquaculture sector. This report provides a comprehensive overview of the latest information available on the structure, social, economical and competitive performance of the aquaculture sector at the national and at the overall EU level.

Data used in this publication stands from 2008 to 2010, and has been collected within the Data Collection Framework (DCF). The data collected is reported by totals and segments. Aquaculture companies and their data, have been classified into different segments made from the combination of the main species produced (salmon, trout, sea bass and sea bream, carp, other freshwater fish, other marine fish, mussel, oyster, clam and other shellfish) and the main technology employed (hatcheries and nurseries, on growing, combined, cages, rafts, long lines, bottom and others). The data analysed covers Income (turnover, subsidies and other income), Personnel costs (Wages and salaries of staff and Imputed value of unpaid labour), Energy costs, Raw material costs (livestock costs and feed costs), Repair and maintenance costs, Other operational costs, Capital costs (depreciation of capital and financial costs), Extraordinary costs, Capital value, Net Investments, Debt, Raw material volume (livestock and feed), Volume of sales, Employment (Number of persons employed and FTE national) and Number of enterprises for the years 2008 to 2010. Moreover, turnover and volume of sales are detailed by species.

On the DCF regulation concerning the aquaculture sector, the collection of freshwater aquaculture is voluntary, while marine aquaculture is compulsory. Therefore, the DCF data collection is only applied to the 22 EU's coastal Member States. Belgium, Latvia and Lithuania provided no data under the DCF because most of their aquaculture production is freshwater based. Germany, Poland and Slovenia submitted marine water aquaculture data, but not on the freshwater aquaculture. The Netherlands only provided data for 2008 and 2009, Greece did not provide any data in this data call, and Italian data reported refers to a sample of the total Italian aquaculture production, and consequently these data could not be used in this exercise.

The 2012 Economic Performance of the European Union Aquaculture sector report is structured as follows. The rest of this section presents the Terms of Reference for this report and lists the experts that participated in its production. It is followed by the overview of the EU aquaculture sector that contains a section on the interactions between fisheries and aquaculture, followed by an analysis of the structure of the sector and its subsectors (shellfish, marine and freshwater). Then it contains the 27 national chapters. Finally, there are presented the glossary, the list of references used and the appendices that include the review of the TORs for the DCF workshop on aquaculture and the Evaluation of the European Aquaculture Performance Indicators (EAPI).

2.1 Terms of Reference

Following the latest DCF call for economic data on the EU aquaculture, EWG 12-13 is requested to analyse and comment on the economic performance of the EU and national aquaculture sectors between 2008 and 2010. It is also requested to evaluate the European Aquaculture Performance Indicators as described below.

1. PRODUCE THE ECONOMIC REPORT ON AQUACULTURE SECTOR 2012:

The Economic Report on Aquaculture sector 2012 shall include:

1. A summary containing key findings from the EU overview section of the report.
2. EU aquaculture economic overview
3. National chapters on the economic performance of the aquaculture sectors, providing:
    - National aquaculture overview
    - Description of trends and drivers for change
4. EU analyses of economic performance by aquaculture sector
5. Conclusions
6. Glossary

2. EVALUATE EUROPEAN AQUACULTURE PERFORMANCE INDICATORS (EAPI):

In support of DG MARE, JRC developed European Aquaculture Performance Indicators (EAPI), identifying the relative starting positions and different circumstances in the Member States. The EAPI are based on statistical data and data from the aquaculture data call. The chosen performance indicators could also serve as a tool to make the results of the policy cooperation measurable.

The EWG is requested to comment on the proposed EAPI. In particular, they are invited to provide for their relevant national chapter of the EAPI documents a reply to the following questions:

- Do the data are consistent with the national aquaculture situation?
- If not, what data are not consistent and what would be the correct data?
- Does the national chapter of the EAPI report give a fairly correct picture of the national aquaculture situation?
- If not, what part and why does it not sufficiently reflect the national situation?

2.2 Data collected under the DCF

The economic variables to be collected for the aquaculture industry sector under the Data Collection are specified in section A of the Chapter IV and in Appendix XII of Commission Decision 2008/949/EC of the 6th of November 2008, on Adopting a multiannual Community programme pursuant to Council Regulation (EC) No

199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy.

Figure 2.1: List of economic variables for the aquaculture sector

Variable group	Variable	Unit
Income	Turnover	EUR
	Subsidies	EUR
	Other income	EUR
Personnel costs	Wages and salaries	EUR
	Imputed value of unpaid labour	EUR
Energy costs	Energy costs	EUR
Raw material costs	Livestock costs	EUR
	Feed costs	EUR
Repair and maintenance costs	Repair and maintenance	EUR
Other operational costs	Other operational costs	EUR
Capital costs	Depreciation of capital	EUR
	Financial costs, net	EUR
Extraordinary costs, net	Extraordinary costs, net	EUR
Capital value	Total value of assets	EUR
Net Investments	Net Investments	EUR
Debt	Debt	EUR
Raw material volume	Livestock	Tonne
	Fish feed	Tonne
Volume of sales	Volume of sales	Tonne
Employment	Number of persons employed	Number
	FTE National	Number
Number of enterprises	Number of enterprises	Number

More detail on the parameters can be found in the glossary (section 6).

Data is asked to be reported by segment and in total. Segments are a combination of the main species cultured and the technology used for their production.

Segments are classified by the following main species:

1. *Salmon*
2. *Trout*
3. *Sea bass & Sea bream*
4. *Carp*
5. *Other freshwater fish*
6. *Other marine fish*
7. *Mussel*
8. *Oyster*
9. *Clam*
10. *Other shellfish*

Segments are also classified by the technology used:

- Fish farming:

- *Land based:*
  - *Hatcheries and nurseries*
  - *On growing*
  - *Combined*
- *Cages*

- Shellfish farming
  - *Rafts*
  - *Long line*
  - *Bottom*
  - *Other*

2.3 Participants at EWG 12-13

External Experts

- Avdelas, Lamprakis
- Avdic-Mravlje, Edo
- Bjorndal, Trond
- Borges Marques, Ana Cristina
- Ebeling, Michael
- Elias, Leonor
- Fernandez Polanco, Jose M.
- Guillen, Jordi (chair)
- Le Bihan, Veronique
- Lees, Janek
- Nielsen, Rasmus
- Nilsson, Pia
- Pienkowska, Barbara
- Reese, Allan
- Rodgers, Phillip
- Sainz de la Torre, Ana
- Stroie, Constantin
- Tikakoski, Simo

Experts by correspondence

- Bartelings, Heleen
- Dennis, John
- Urumov, Stoyan

JRC experts

- Carvalho, Natacha
- Contini, Franca
- Fiore, Gianluca

- Hofherr, Johann
- Motova, Arina
- Natale, Fabrizio
- Virtanen, Jarno

The full list of participants at EWG 12-13 held from the 24 to 28 September 2012 in Ispra, Italy is presented in section 8.6.

2.4 Chairman's comments

First, I would like to thank all the people involved in the elaboration of this 2012 Economic Performance of the European Union Aquaculture sector report.

This report provides a unique comprehensive overview of the latest information available on the structure, social, economical and competitive performance of the aquaculture sector at the national and at the overall EU level. After last year's report, this is the second one of this type, produced for the aquaculture sector.

Data used in this publication stands from 2008 to 2010, and has been collected within the Data Collection Framework (DCF). The collection of freshwater aquaculture is voluntary under the DCF regulation, while marine aquaculture is compulsory. This leads to an important lack of coverage from non-reported freshwater aquaculture. Sadly, there is even a larger lack of coverage from Member States not submitting the requested data. Moreover, in some of the reported data there are still remaining data quality issues.

Considering that it is aimed to reduce the production time of the 2013 aquaculture report, it is of extreme importance to improve the quality of the data available at the EWG meeting, in order not to diminish the quality of this report. In the best-case scenario, data quality problems lead to data resubmissions and delays on the report production. Considering the reduction in the production time for the 2013 report, data checks will not be possible after the EWG meeting. Moreover, improvements in the quality of the data available at the meeting would let the experts more time to focus on more productive tasks than the data checks.

It is our hope that coverage and quality of the EU aquaculture sector data will increase in the next data calls, so that future reports on the Economic Performance of the European Union Aquaculture sector will provide a more accurate image of the EU aquaculture sector.

From this report, I would like to draw your attention to the *EU overview* (chapter 3) and the *structure of the sector* (chapter 4) where overall aquaculture data are presented. Especially, section 3.5, on the *interactions between fisheries and aquaculture* provides a briefly overview on the impacts and synergies derived from the aquaculture sector.

Finally, the European Aquaculture Performance Indicators (EAPI) developed by the Joint Research Centre (JRC) are shortly presented in section 8.2. Apart from being a good tool for Member States to draft their multiannual national strategic programs (as established by the new CFP) and monitor their evolution, the EAPI indicators can become a powerful instrument to complement the analysis performed in these STECF aquaculture reports.

3 Overview of the EU Aquaculture sector

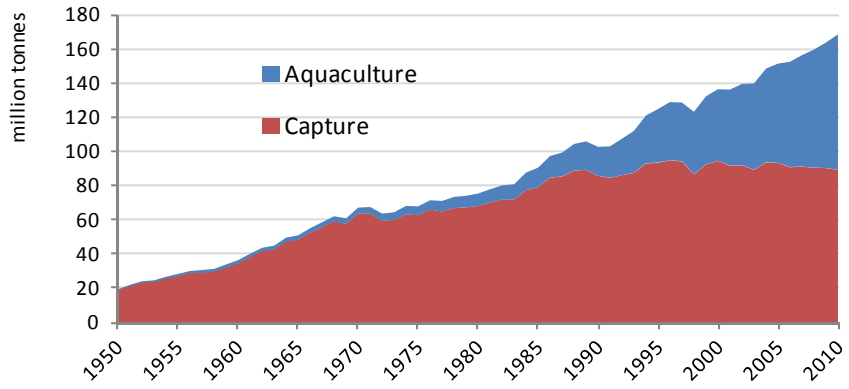
3.1 Introduction

Aquaculture is the fastest growing animal food producing sector in the world and is an increasingly important contributor to global food supply, food security and economic growth. Moreover, aquaculture has become something more than an alternative to wild capture fisheries for food production. In fact, FAO estimates than in the year 2030, 65 % of all seafood[1] consumption will come from aquaculture (FAO).

Capture fisheries production worldwide accounted for 89.5 million tonnes in 2010. Production from world capture fisheries has been fluctuating around 90 million tonnes per year during the last two decades. On the other hand, aquaculture production shows an increasing trend that led to a production of 78.9 million tonnes globally in 2010, as can be seen from figure 3.1. It should be noted that the aquaculture production includes the production of around 19 million tonnes of algae.

In 2010, aquaculture represented 47 % of the total seafood production in the world, valued in 94.5 billion Euros (125.2 billion USD)[2]. This is a substantial increase since 2000 where aquaculture made up for 31 % of the world seafood production, 16 % in 1990 and 9.7 % in 1980.

Figure 3.1 World seafood production (capture and aquaculture): 1950-2010.



(Source: FAO)

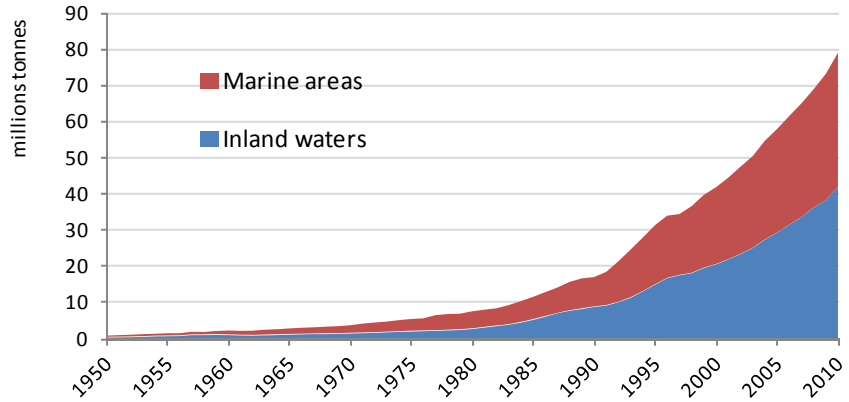
[1] Seafood is used on a wide sense, including all food originated from both marine and inland waters.

[2] The exchange rate used: 1 EUR equal to 1.3257 USD, following European Central Bank exchange rate data.

It should also be noted that around 27.3 million tonnes of the capture production were used for non-human consumption activities (among others for terrestrial livestock feed and aquaculture), leaving around 62 million tonnes of capture production for human consumption (FAO). Therefore, aquaculture is the main seafood source for human consumption worldwide.

During the last decades, aquaculture production in volume from both marine and freshwater have been quite similar. In fact, 41.8 million tonnes (53 %) came from freshwater and 37.1 million tonnes (47 %) from marine areas in 2010 (FAO). The evolution of the global aquaculture production by environment (marine and freshwater) is represented in figure 3.2.

Figure 3.2 World aquaculture production by environment: 1950-2010.



(Source: FAO)

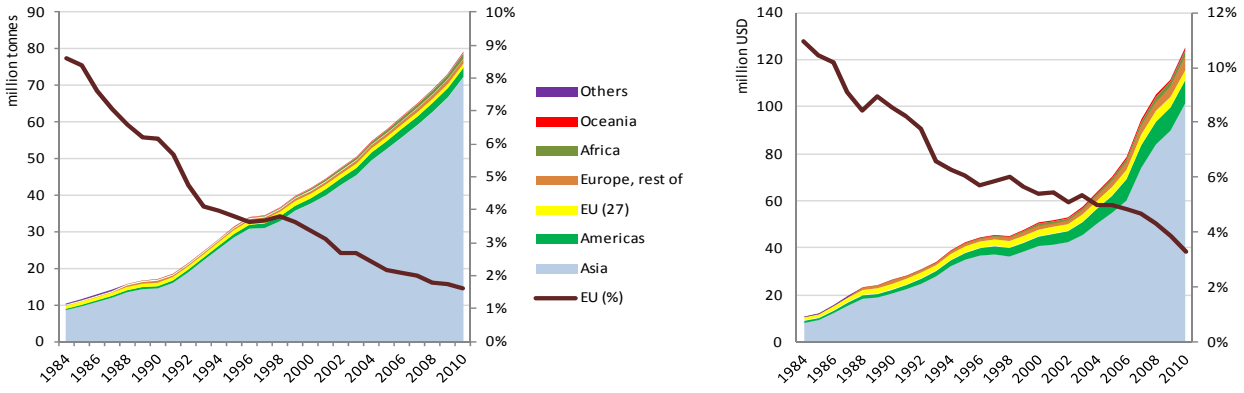
Asia produces 91 % of the world aquaculture production in weight and 81 % in terms of value. Europe represents only 3.2 % of the world aquaculture production in volume and 8.1 % in value.

3.2 The EU aquaculture sector

Aquaculture production by the 27 European Union Member States (EU 27) reached 1.26 million tonnes and 3.1 billion Euros in 2010 (FAO).

The EU (27) represents 1.6 % of the world aquaculture production in volume and 3.3 % in value. The EU (27) contribution to world aquaculture production has been decreasing significantly over time, as can be seen in figure 3.3.

Figure 3.3 World aquaculture production by continent and the EU share (volume and value): 1984-2010.

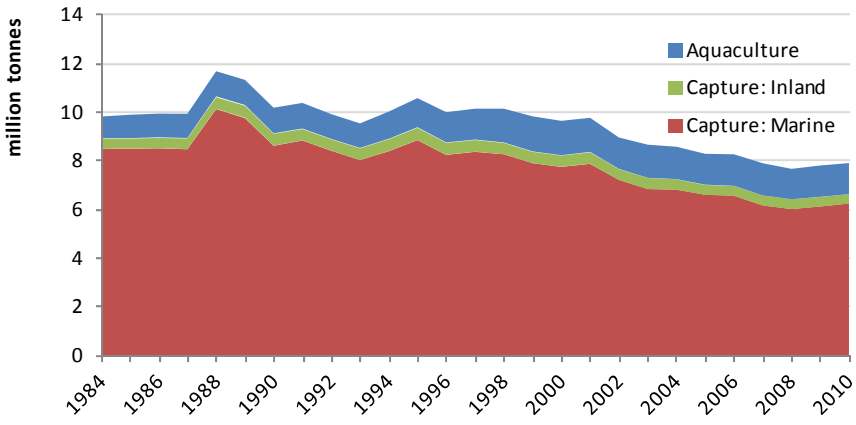


(Source: Own elaboration from FAO data)

The EU (27) aquaculture production in volume peaked in the late 1990s, with 1.43 million tonnes (figure 3.4). Subsequently, production has been relatively stable or decreased slightly reaching 1.26 million tonnes in 2010. Concurrently, EU capture fisheries have been declining since the late 1980s.

The EU aquaculture represented 16 % of the total EU seafood production in 2010. Marine capture fisheries represented 79 % and inland capture fisheries 5 % (see figure 3.4). The share of aquaculture increased from less than 10 % in the late 1980's, but has remained relatively stable at 15-16 % of the EU seafood production since the mid-2000s.

Figure 3.4 EU (27) seafood production (capture and aquaculture): 1984-2010.

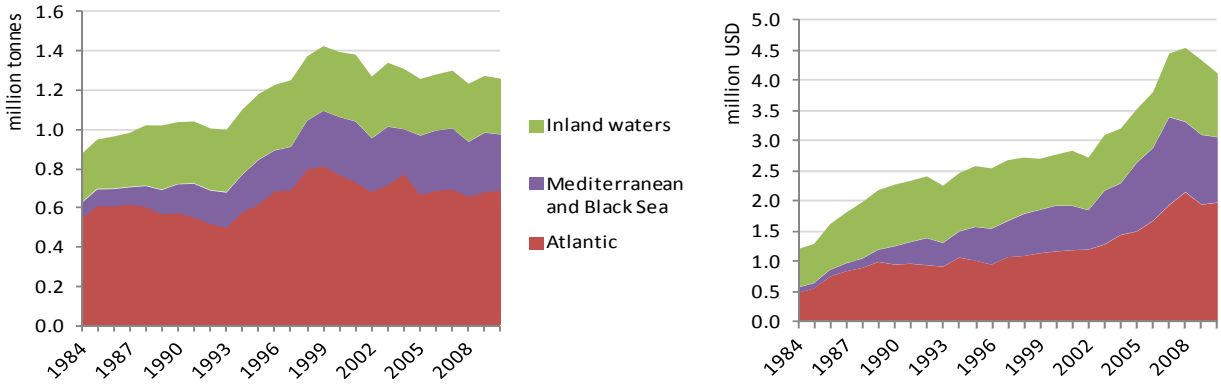


(Source: FAO)

The global picture (figure 3.2) where freshwater and marine aquaculture production volumes are quite similar is not reflected in EU; in Europe marine aquaculture predominates, both in volume and value (figure 3.4).

In 2010, Marine aquaculture represented 78 % (Atlantic and Mediterranean aquaculture combined) of the total EU (27) aquaculture production in volume, and 75 % in value, and its importance has been increasing in the last two decades (FAO). In the Atlantic, aquaculture production accounted for 55 % in volume and 48 % in value while the Mediterranean and inland waters accounted for 23 % in volume and 26 % in value of the total EU aquaculture production in 2010 (see figure 3.5).

Figure 3.5 EU (27) aquaculture production in weight and value by region: 1984-2010.

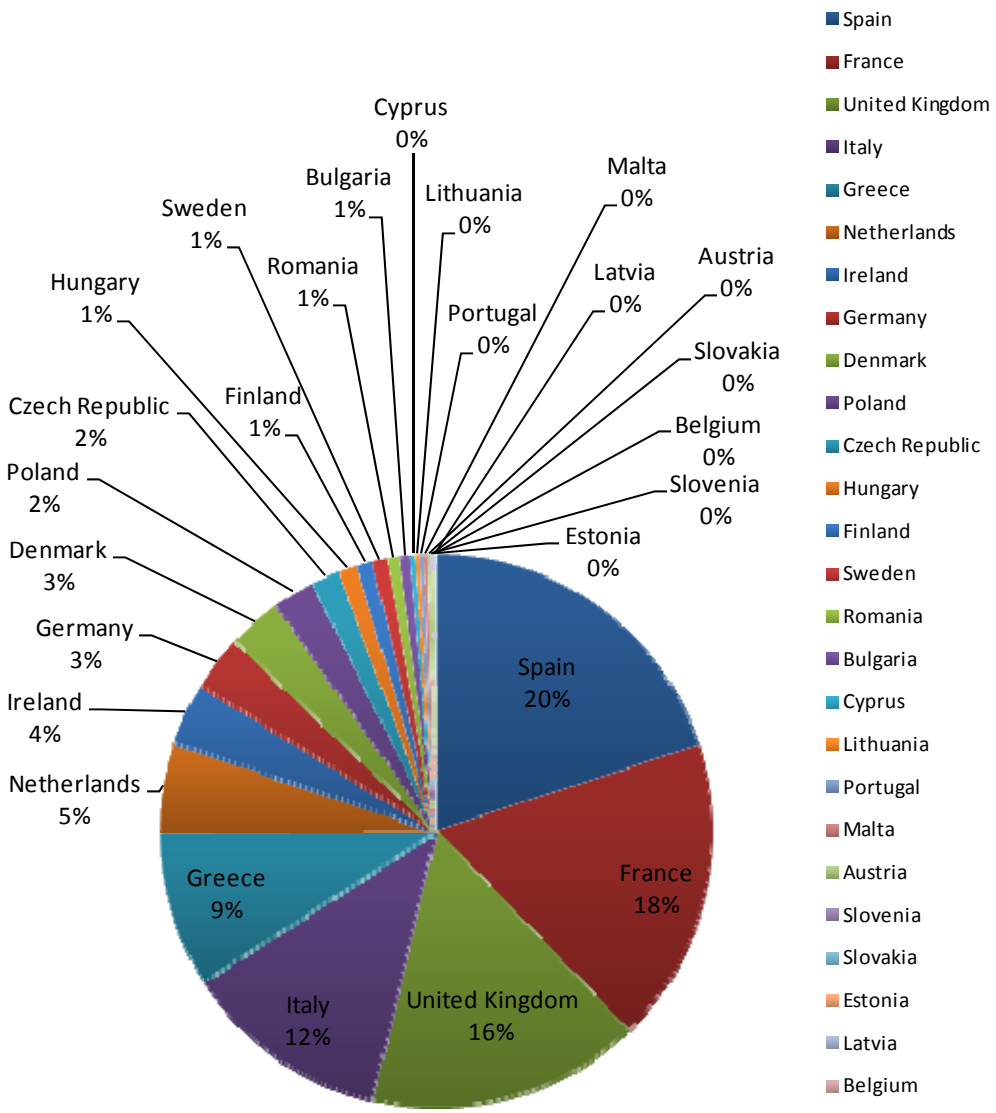


(Source: FAO)

EU aquaculture production is mainly concentrated in 5 countries: France, Greece, Italy, Spain and United Kingdom. Figures 3.6 and 3.7 show the significance of each Member State's aquaculture in the relation to the total EU aquaculture production, in both weight and value.

Spain, with 20 % of the total EU production in volume, is the largest aquaculture producer in the EU, followed by France (18 %), United Kingdom (16 %), Italy (12 %) and Greece (9 %). These five countries account for 75 % of the total EU aquaculture production in weight (FAO).

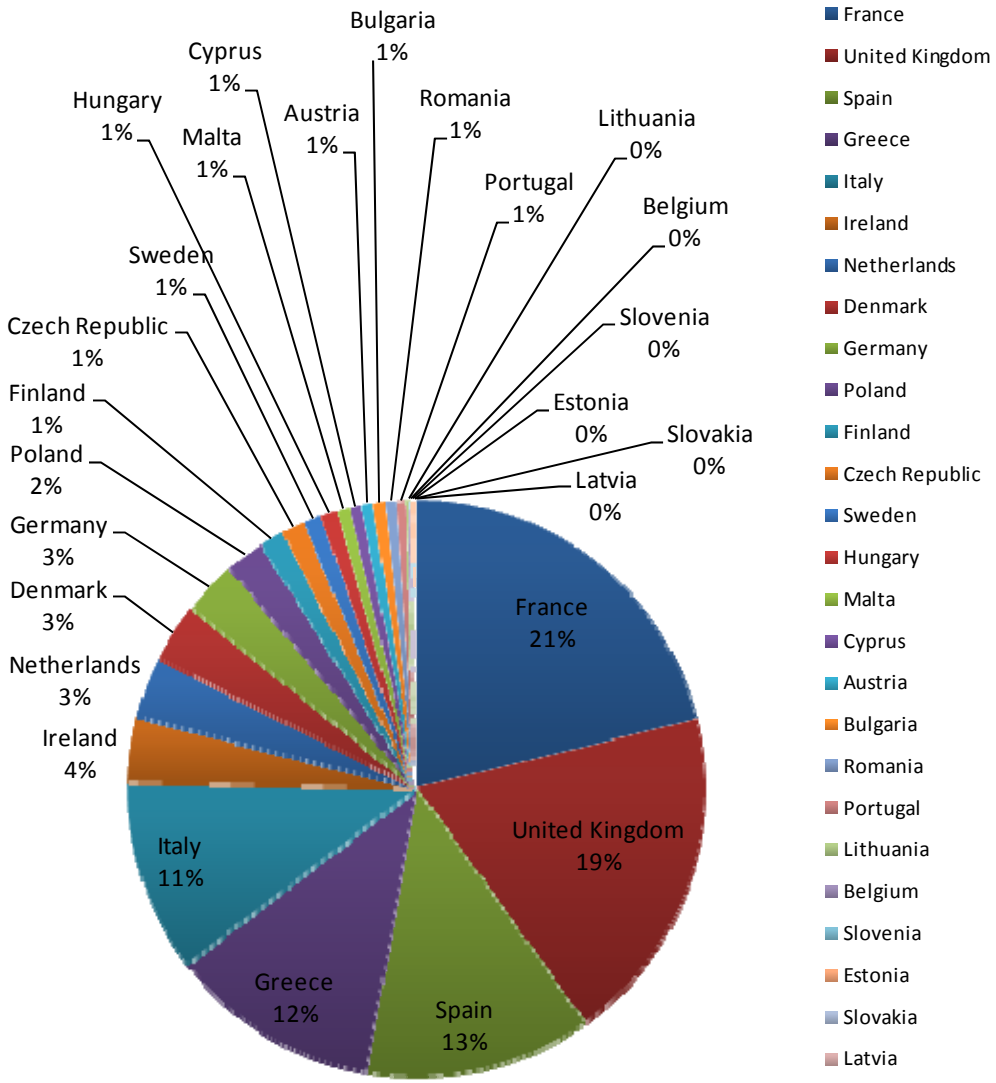
Figure 3.6 Aquaculture in EU per MS in weight terms: 2010.



(Source: FAO)

In terms of value, France is the largest EU producer with 21 % of the total EU aquaculture, followed by the United Kingdom (19 %), Spain (13 %), Greece (12 %) and Italy (11 %). These five countries are responsible for 76 % of all the EU aquaculture value (FAO).

Figure 3.7 Aquaculture in EU per MS in value terms: 2010.



(Source: FAO)

It should be noted that Spain has the largest aquaculture production volume (21 % of the total EU production), but only third in value (13 % of the total EU production). This is because 75 % of the Spanish aquaculture production in volume comes from mussel production but represents only 24% in value due to the low market value of mussels (around 0.5 Euros per Kg.).

3.3 Data coverage for the elaboration of this report

Data on the EU aquaculture sector was requested under the Data Collection Framework (DCF) (cf. Council regulation, European Commission (EC) No 199/2008 of 25th February 2008) for the years 2008-2010.The call for data was issued by DG MARE on the 21 May 2012. Member States were requested to submit the data within 1 month of the call, making the submission deadline the 21 June 2012.

All EU Member States are required to collect and provide data on salt water aquaculture, while the collection of data on fresh water aquaculture is not compulsory. The Data Collection Framework (DCF) requires data quality assurance by Member States. Data checks were performed by the JRC and by experts attending the meeting to elaborate this report. This lead to data resubmissions after the deadline and even after the EWG meeting.

This was the second call for aquaculture data from Member States. Although there was some improvement in the quality of the data submitted compared to the previous call, there are still many issues with several parameters that Member States are working to improve. Data coverage remained similar to the previous data call. The main data coverage issues in the report are summarised in the following points:

- Under the DCF, the submission of marine aquaculture data is compulsory; while the submission of inland freshwater aquaculture data is voluntary. Therefore, aquaculture data is not requested from the EU landlocked countries (Austria, Czech Republic, Hungary, Luxemburg and Slovakia). According to FAO and Eurostat figures, aquaculture production in these Member States was less than 3 % of the total EU aquaculture production in 2010.

- Aquaculture production in Latvia and Lithuania is based on freshwater species that are not mandatory and, hence these MS do not carry out a data collection system for the aquaculture sector. Nonetheless, the production of these countries is minor at the European level (less than 0.5 % of the EU total aquaculture production in 2010).

- Belgium and Greece did not provide any data in this data call. While, Greece did not respond to the data call, Belgium sent a note stating that the response rate of their survey was too low to be able to estimate the economic parameters required. Indeed, the low number of salt water aquaculture companies in Belgium leads easily to confidentiality issues. While, the Belgian aquaculture production is almost negligible (less than 0.1 % of the EU total production), Greek aquaculture production is rather significant, representing 9 % in weight and 12 % in value of the EU aquaculture production.

- The Netherlands only provided data for 2008 and 2009. Missing 2010 Dutch aquaculture data represents 5 % in weight and 3 % in value of the EU aquaculture production.

- Germany, Poland and Slovenia only reported the mandatory marine aquaculture data. Hence, the unreported freshwater aquaculture production from these Member States accounted for 5 % of the EU aquaculture production in 2010.

- Even if Italy provided aquaculture data for the 3 years, the data reported refers to a sample of the total Italian aquaculture production, and consequently this data cannot be used in this exercise. Italian aquaculture production is also significant, since it represents 12 % in weight and 11 % in value of the total EU aquaculture production.

- The United Kingdom failed to provide detailed cost structure data. UK aquaculture data represents 16 % in weight and 19 % in value of the total EU aquaculture production.

- Moreover, Poland and Romania provided data for 2009 and 2010, but not for 2008. France provided a full set of economic variables only for 2010.

Therefore, EU aquaculture production and turnover for EU 27 (including landlocked countries) have been fully estimated (100 % coverage) by including FAO data to fill the missing parameters in this report. General national information (i.e. number of companies, employees) is available for two thirds of the total EU production. The necessary data to fully estimate the economic performance at the national, as well as at segment level, have been provided for slightly more than half of the EU aquaculture production.

Compared to the previous data call, availability of general national information has decreased from three quarters to two thirds, while data available to perform the full economic analysis increased from two fifths to half the EU aquaculture production.

3.4 Economic performance of the EU aquaculture sector

Table 3.1, reports the number of enterprises, total sales volume, turnover, employment measures in FTE and mean wages for the analysed EU countries in 2010.

The values reported in table 3.1, have been complemented with FAO data mainly to overcome the lack of some Member States freshwater aquaculture data (FAO data reported in blue).

Table 3.1 Economic Indicators for the EU (27) aquaculture sector: 2010.

	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Mean wage
	(number)	(thousand tonnes)	(million €)	(number)	(number)	(thousand €)
Austria	-	2	20	-	-	-
Belgium	-	1	3	-	-	-
Bulgaria	347	4	10	218	218	2.3
Cyprus	9	4	23	116	204	15.4
Czech Republic	-	20	41	-	-	-
Denmark	154	42	136	436	291	73.0
Estonia	11	0	1	30	21	13.2
Finland	234	13	50	359	290	37.3
France	3,298	313	883	19,814	11,130	24.4
Germany	-	41	95	-	-	-
Greece	-	113	367	-	-	-
Hungary	-	14	28	-	-	-
Ireland	303	46	123	1,719	956	26.6
Italy	-	153	333	-	-	-
Latvia	-	1	1	-	-	-
Lithuania	-	3	6	-	-	-
Luxembourg	0	0	0	0	0	-
Malta	6	5	54	227	161	20.4
Netherlands	-	67	107	-	-	-
Poland	-	31	68	-	-	-
Portugal	1,459	7	42	2,320	1,228	7.2
Romania	444	13	31	3,933	3,932	2.8
Slovakia	-	1	2	-	-	-
Slovenia	-	1	2	-	-	-
Spain	3,066	252	469	27,907	6,377	20.6
Sweden	175	12	41	399	230	28.6
United Kingdom	428	201	643	4,000	4,000	18.3
Total EU	***9,934***	***1,361***	***3,580***	***61,478***	***29,038***	***19.4***

= FAO source

= DCF source

Number of companies

Available data (from 13 countries) reports almost 10 thousand companies in 2010[3]. We estimate, however, that in the EU (22) the total number of companies with aquaculture as their main activity is between 14 and 15 thousand[4].

The majority of the companies in the EU aquaculture sector are micro-enterprises (with less than 10 employees). In 2010, these comprised 90 % of all aquaculture enterprises in the EU[5].

Total Sales Volume

The total sales volume for the EU (27) aquaculture sector, using DCF and FAO data, is estimated to be 1.36 million tonnes in 2010.

DCF data on Total Sales Volume was complemented with FAO production data to provide an overview of all 27 EU Member States. Both, FAO and EUROSTAT report data on production, however, their definition of production is based on first sales[6]. Hence, DCF, Eurostat and FAO report sales, but DCF data may not be identical to Eurostat and FAO data due to differences in the reference population [7].

[3] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. Available data from these 13 countries correspond to 67 % of the total EU production in weight and 70 % in value.

[4] The same figure estimated in the 2011 aquaculture report (STECF, 2012). In the report, a total of 12,703 enterprises in 18 EU countries were reported for 2009. Additionally, the report included 108 Belgian, 1,040 Greek, 754 Italian, 21 Lithuanian and 1,177 Polish enterprises. When extrapolating the number of reported companies by the quantity of production for both 2009 and 2010, the total number of aquaculture companies in the EU should be between 14 and 15 thousand. Available data also suggest that the total number of enterprises has not changed significantly. The same 13 countries that reported 9,934 companies in 2010, reported 9,581 companies in 2009. The increase between both years is largely due to France increasing the number of reported segments and Romania augmenting the number of licenses to exploit ponds.

[5] In the EU aquaculture sector, and based on data from the 13 countries detailed in footnote 2, enterprises with 5 or less employees represented 77.7 % of the EU aquaculture companies in 2010, followed by enterprises with 6 to 10 employees (12.0%) and then enterprises with more than 10 employees (10.3 %). The number of the smaller companies (5 or less employees) increased from 7,322 to 7,717 (5.4 %) between 2009-2010; enterprises with 6 to 10 employees decreased from 1,386 to 1,197 companies (13.6 %); while enterprises with more than 10 employees increased from 873 to 1,020 companies (16.8 %).

[6] Article 2, of the EC Regulation No 762/2008 of the European Parliament and of the Council of 9 July 2008 on the submission by Member States of statistics on aquaculture and repealing Council Regulation (EC) No 788/96, defines "production" as the output from aquaculture at first sale, including production from hatcheries and nurseries offered for sale. It should be noted that total sales it is used as an estimate of total production. Even both variables can have a similar evolution over time, they can be different year by year. This happens because companies may decide to keep more or less fish on stock depending on the economic expectations, and because there are long-live species that may take several years

Turnover

The total value of sales, or turnover, from the EU (27) aquaculture sector is estimated to have reached 3.58 billion Euros in 2010. DCF data on turnover has been complemented with FAO production value data to provide an overview for all 27 EU Member States[8].

Employment and FTE

From the available data we estimate that the EU (27) aquaculture sector directly employs more than 85,000 people [9]. Current data suggest that the total employment has not changed significantly[10].

For these 13 countries it has been reported a total employment in full time equivalents (FTE) of 29,038 FTEs for 2010[11], indicating a slight increase from 2009.

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to grow. On this last case, production (in weight terms) takes place every year, but the sale may only take place at the last year of the production.

[7] Eurostat and FAO data is based on all aquaculture production destined for human consumption, while DCF data is based on all aquaculture production (for human-consumption and other) from companies whose main activity is aquaculture.

[8] As explained for the production volume, both, FAO and EUROSTAT report data on production, however, their definition of production is based on first sales. Hence, DCF, Eurostat and FAO report sales, but DCF data may not identical to Eurostat and FAO data due to differences in the reference population

[9] On 2011 aquaculture report, it was detailed the existence of more than 70 thousand direct employments in 2009 for 16 EU countries. Current data stand for 13 countries: Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. In the 2011 aquaculture report it was also included 5,947 employments in Greece, 5,642 employments in Poland and 255 employments in the Netherlands. Hence, by extrapolation data suggest that the EU 27 aquaculture sector must employ between 85 and 90 thousand persons.

[10] The data reported from 13 countries suggest that the employment in the EU aquaculture has been quite stable between 2009 and 2010. In 2010, 61,478 persons were working on the aquaculture sector of these 13 countries. While, the same 13 countries reported a total employment of 61,293 for 2009, a 0.3 % increase. However, when looking at the country data in detail it can be seen that employment has decreased between 1 and 15 % (7 out of 13 countries). This minor increase could be in part due to the increase in the number of segments reported by France.

[11] This supposes a slight increase from the 28,127 FTEs reported for 2009 by the same countries. It can be seen that even if the total values remain quite stable there have been important decreases in the FTEs for Bulgaria and United Kingdom, while relevant increases for France and Romania. As mentioned before, the increase in French FTEs could just be due to the increase in the number of French segments reported for 2010. Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

The EU aquaculture sector has an important component of part-time work. This evident from the proportion of employment measured in full time equivalents (FTE) and total employment. The lower the ratio the more part-time work exists; while the higher (closest to 1) the ratio is, the occupation is more full time. Current available data shows that the ratio for the EU aquaculture sector in 2010 was 47 %[12].

Data available (from 12 countries) show that women accounted for the 29 % of the EU aquaculture sector employments, the 23 % measured in FTE in 2010[13].

Mean wages

Available data (from 13 countries) suggest that the average wage (per FTE) for the EU aquaculture sector in 2010 was about 19,400 Euros per year[14]. Available data (from 12 countries) show a 12.6 % increase in the salaries; however, salary increases were not perceived in all countries. In fact, there was a salary increase in two thirds of the countries[15].

There is a lot of variability on the salaries paid in each country and subsector. The salaries varied from about 1,900 Euros per year in Bulgaria to 73,500 Euros per year in Denmark. The variability per subsector and country is going to be analysed in more detail in the next chapter.

[12] The ratio between the employment measured in full time equivalents (FTE) and the total employment was 47.2 % (for the 13 countries where data are available) in 2010. Very similar to the 45.9 % estimated for 2009, for the same 13 countries. Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

[13] The ratio between the female employment by the male and female employment was 28.7 % in 2010; while the ratio between the female FTEs by the male and female FTEs was 22.6 %. Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain and Sweden. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. Data for the United Kingdom have not been included because all employment was wrongly reported as male employment, as it is indicated on the United Kingdom national chapter.

[14] The average wage is calculated as the sum of the costs in wages and salaries and the imputed value of unpaid labour divided by the total number of employees in FTEs. Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

[15] The same 13 countries detailed in footnote 12 has been considered, with the exception of France because no salary cost data was available for 2009. The salary increase between 2009 and 2010 has been detected in 8 out of 12 countries.

Table 3.2 Economic Performance Indicators for the EU (22) aquaculture sector: 2010.

	Gross Value Added (thousand €)	Earning before interest and tax (thousand €)	Return on Investment (%)	Labour productivity (thousand €)	Capital productivity (%)
Belgium	-	-	-	-	-
Bulgaria	7,496	6,721	101.5	34.4	113.2
Cyprus	9,675	5,736	15.7	47.3	26.4
Denmark	35,240	6,746	3.8	121.1	20.1
Estonia	687	314	6.6	32.7	14.5
Finland	16,483	3,971	5.3	56.8	22.0
France	446,624	142,695	12.3	43.1	38.4
Germany	-	-	-	-	-
Greece	-	-	-	-	-
Ireland	47,671	8,885	5.2	49.9	27.9
Italy	-	-	-	-	-
Latvia	-	-	-	-	-
Lithuania	-	-	-	-	-
Malta	14,771	5,144	37.5	91.7	107.7
Netherlands	-	-	-	-	-
Poland	-	-	-	-	-
Portugal	12,306	-1,648	-0.7	10.0	5.5
Romania	13,047	-1,871	-0.5	3.3	3.4
Slovenia	-	-	-	-	-
Spain	160,790	4,541	0.5	25.2	16.6
Sweden	11,989	4,370	9.0	52.1	24.7
United Kingdom	177,000	-	-	44.3	69.4
Total	*953,780*	*185,604*	*5.7*	*33.8*	*30.3*

Gross Value Added

Available data (from 13 countries) report that the EU aquaculture sector provided in 2010 almost 1 billion Euros in Gross Value Added[16]. Considering a similar economic structure, it could be estimated that the GVA for the EU (27) aquaculture sector would had been near 1.5 billion Euros in 2010.

Operating Profit or EBIT (Earnings Before Interest and Taxes)

Available data (from 12 countries) show that in 2010 the EU aquaculture sector has obtained profits after two years of suffering losses. The profitability for those 12 Member States measured in EBIT terms was more than

[16] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and the United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

185 million Euros[17]. This relevant profitability is mainly thanks to the French results that accounted for more than 142 million Euros. Anyway, for the 12 Member States that reported data to calculate this indicator in 2010, only two of them (Portugal and Romania) were not profitable.

Operating Profit (EBIT) margin and ROI (Return On Investment)

Data available (from 12 countries) confirms the recovery in the profitability of the EU aquaculture sector in 2010. The operating profit margin is estimated at around 10.0 % for 2010[18]. The operating profit margin or EBIT ratio is obtained by dividing the EBIT by the turnover. However, the return on investment for aquaculture, which is a better measure of long term viability, was 5.7 % in 2010[19].

These economic indicators are in line with the recovery of profitability for 2010 already anticipated by Guillen and Natale (2012). In their study, using data from the Amadeus database, the EBIT ratio increased from 4.9 % in 2009 to 7.5 % in 2010.

Labour productivity

Reported data (from 13 countries) shows that the labour productivity for the EU aquaculture sector was about 33,800 Euros per FTE in 2010[20].

Capital Productivity

[17] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain and Sweden. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. Available data from these 12 countries correspond to half the total EU production in weight and value terms.

[18] The EBIT ratio could not be calculated for France in 2009. Hence, the EBIT ratio (from 11 countries, excluding France) in 2010 was 4.4 %. This shows a relevant increase from 2009, when the EBIT ratio (from the same 11 countries) was -9.8 %.

[19] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain and Sweden. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. The ROI could not be calculated for France in 2009 because of missing data. Hence, the ROI (from 11 countries, excluding France) in 2010 was 2.0 %. This shows a relevant increase from 2009, when the ROI was -6.1 % (from the same 11 countries).

[20] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

Reported data (from 13 countries) shows that the capital productivity for the EU aquaculture sector was about 30.3 % in 2010[21].

Financial position

The financial position is defined as the ratio between debts and total value of assets, and therefore it shows the level of debts in the different segments. Available data (from 13 countries) show that the financial position was 39.7 % in 2010[22]. This ratio is relatively low, in great part due to the unexpectedly low debt ratio for the Spanish aquaculture sector (3.8 %). This low ratio does not match with reality according to alternative accountancy based sources and the overall ratio is expected to increase with data quality improvements. Due to high variations on the availability of data by Member State further analysis should be done at a more detailed level.

Future Expectations Indicator (FEI)

The FEI (STECF, 2011) indicates whether the industry in a sector is investing more than the depreciation of their current assets. With data from 13 countries the FEI for the EU aquaculture sector was estimated at 5.3 %[23]. Therefore, the industry is investing itself, and consequently should have positive expectations on the future development of the sector.

A closer look by country, it shows that 5 of the 13 countries show a negative FEI (Spain, France, Ireland, Finland and Malta). On the other hand it is positive for 8 countries (Bulgaria, Cyprus, Denmark, Estonia, Italy, Portugal, Romania and Sweden). It could be possible that countries with a more mature aquaculture sector tend to have lower investments in the sector and so a lower FEI indicator, while countries with developing or restructuring aquaculture sectors reflect a larger investment effort. However, as it has been said for previous indicators there is the need to look at it at a more detailed level, by sectors, as it is done in next chapter.

[21] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

[22] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total. The financial position could not be calculated for France in 2009. Hence, the financial position (from 12 countries, excluding France) in 2010 was 33.9 %. This shows a decrease from 2009, when the financial position (from the same 12 countries) was -29.1 %.

[23] Data are available for Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania, Spain, Sweden and United Kingdom. Data from Germany, Italy, Poland and Slovenia have not been included because they do not refer to the national total.

3.5 Interactions between fisheries and aquaculture

The evolution of aquaculture is much related to capture (wild) fisheries. Interactions between capture fisheries and aquaculture can be classified in two main groups: economic and environmental. These interactions may result in both beneficial and harmful consequences for both sectors. Despite isolated issues, there are important potential benefits for the coastal and fishing communities derived from the sustainable development of the European Aquaculture.

Environmental impacts and the use of coastal areas

Among the environmental impacts, aquaculture has had an influence on catches of species used as inputs for the aquaculture industry. In certain parts of the world, this has impacted and displaced wild populations in areas where intensive farming has been implemented; caused environmental degradation; and been cause of diseases transmissions due to escapees of infected specimens and vice-versa when infected wild breeders are incorporated to farming activities (Gillett, 2008). These kinds of negative interactions are less frequent problematic in developed countries like the EU, due to more restrictive regulations and effective controls.

The increase in demand of fishmeal and fish oil prices has raised their prices. These price increases have caused an important structural change in the fishing sector, and in the case of aquaculture resulted in an incentive for research and innovation (Kristofferson & Anderson, 2006).

Conflicts regarding the use of water resources and common space are frequent between the fisheries and aquaculture sectors. But fisheries are not the only competing sector. Aquaculture expansion is often hampered by the development of other economic sectors, mainly tourism, energy production, recreational navigation and sports, etc.

Finally, even it may be difficult to estimate the extent, restocking of wild populations with farmed juveniles may also contribute to sustain and even increase the revenues of the fishing fleets in certain areas, and also on the recovery of endangered species.

Economic impacts

From an economic point of view, aquaculture has affected seafood prices mainly due to surplus derived from uncontrolled productions. But it also had a positive influence by the development of new markets and the promotion of seafood consumption (Valderrama & Anderson, 2008). By its contribution to the decrease in the prices of seafood Aquaculture has accelerated globalization of trade and increased concentration and integration in the seafood industry worldwide. Quality improvements and new product developments have been boosted, changing the way of doing business with a stronger market orientation and risk reduction due to decreased price volatility.

Price decreases in capture species due to augmented and uncontrolled supply of aquaculture output have been tested and proven both in the salmon industry (Asche et al, 1999; Knapp et al, 2007) as well as in the European imports of frozen white fish fillets (Fernández-Polanco et al, 2011). However these negative effects on prices

have been rejected for some white fish species (Norman-López, 2009), suggesting that some fisheries are more likely to be affected than other.

Price interactions operate at a global level, and can have serious consequences for producers in developed countries when the imported species come from countries with significantly lower production costs. Less efficient wild fisheries and aquaculture firms may experiment important decreases in profits compromising their future. But certain fisheries, especially those well managed, could benefit from fishing effort reduction, that would lead to increases in the catches and profitability per boat, being able to achieve significant improvements in quality (Knapp, 2007), without reducing the total amount of seafood available for the consumers.

The production and use of fishmeal and fish oil

FAO (2012) estimated that 27.3 million tonnes of global marine catches were destined for non-food purpose. This results in capture fisheries providing about 62 million tonnes of global seafood supply for human consumption, compared to the almost 79 million tonnes from the aquaculture sector.

Of these 27.3 million tonnes destined for non-food purpose (human consumption), 5 to 6 million tonnes per year are used in South and East of Asia as raw feed, coming particularly from shrimp fisheries by-catch, for aquaculture. Also in the Mediterranean, Mexico and Australia 0.3-0.4 million tonnes of whole or chopped fish is used to feed captured tunas. But the largest part, about 20 million tonnes were reduced to fishmeal and fish oil. Fishmeal and fish oil play a key role in the feeding, and consequently on the costs, of a large number of aquaculture segments.

The International Fishmeal and Fish Oil Organisation (IFFO) estimates that worldwide 16.5 million tonnes of fish (whole) and 5.5 million tonnes of by-products (fish parts) were converted into 5.0 million tonnes of fishmeal and 1.0 million tonnes of fish oil in 2008 (Chamberlain, 2011).

Indeed, IFFO estimates that 4.8 million tonnes of fishmeal were produced globally in 2009. The 63 % of this fishmeal produced was used in aquaculture; mainly to feed salmon and trout, crustaceans and other marine fishes (each of them used about the 27 % of the total fishmeal destined to aquaculture). Fishmeal was also used to feed pigs (25 %) and poultry (8 %). The main producers of fishmeal are Peru and Chile (Chamberlain, 2011).

IFFO also estimates that 1.0 million tonnes of fish oil were produced in 2009. The 81 % of all fish oil produced was destined to aquaculture, where it was mainly used in the salmon and trout segment (68 %). Other uses were direct human consumption (13%). The main producers of fish oil are Peru, Scandinavian countries, Chile and the USA (Chamberlain, 2011).

Wijkstrom (FAO, 2011) divides the “whole” fish used for fishmeal and fish oil into three groups:

- Industrial-grade forage fish: This fish has no market as food for human consumption. So, the fisheries would cease if there were no fishmeal plants. Total fisheries production is converted into fishmeal and fish oil, and accounts for about 1.2 million tonnes. Main species in this category are gulf menhaden, sandeels, Atlantic menhaden and Norway pout.

- Food-grade forage fish: This fish has a market as food for human consumption, but it is often very reduced compared to the amounts that are harvested. Fishmeal plants take what food fish markets

cannot absorb. On average, near the 90 % (11.8 million tonnes) of the 13.2 million tonnes landed are processed into fishmeal. Main species in this category are Peruvian anchovy (anchoveta), Japanese anchovy, European anchovy, other anchovies, capelin, blue whiting and European sprat.

- Prime food fish: This is fish that has a regular market for human consumption, but mainly due to large fluctuations and the extreme perishability of some of the species, some amounts are also destined to fishmeal production. Main species in this category could be Chilean jack mackerel, chub mackerel, as well other species of sardine, mackerel and herring.

So, Wijkstrom (FAO, 2011) concludes that thanks to the aquaculture there is a net addition of 7 to 8 million tonnes of fish supplied for human consumption that otherwise would have not been utilised.

Nowadays, it has been proposed a discard ban in EU fisheries. A key aspect of the discard ban proposal is that fish that would be discarded should be landed and processed into fishmeal. Such a discard ban would increase the availability of fishmeal and fish oil, and may probably have an impact on fishmeal and fish oil prices.

However, there are currently no robust estimates of the current amount of discards by species done by the EU fishing fleets. EWG 11-13 (STECF, 2011) reported average annual discards of 1.3 million tonnes in EU waters. These discards are mainly of horse mackerel, herring, blue whiting, Norway pout and roundnose grenadier.

It is also uncertain into what extent fishing fleets can avoid capturing these species and whether selectivity improvements would be incorporated. This produces certain uncertainty on estimating how the discard ban would affect the fishmeal and fish oil production, as well as the economic consequences (in terms of feed cost savings) for the aquaculture sector.

3.6 Trends and triggers of the EU aquaculture

Europe represents the largest market for fish in the world. Over the past decades consumption has increased. However, as own production of fish (capture and farmed) has not increased, net fish imports have increased, and self sufficiency has decreased.

There are many reasons that have lead to an increase in demand for fish. First, population size has increased. Second, overall the real price of fish has come down, making the product more attractive to consumers. Third, real incomes have increased, causing greater demand for fish. Finally, consumers have become more health conscious, causing a positive shift in demand as fish consumption is known to have important health benefits.

EU landings of wild fish have been stagnant or even decreasing; while EU aquaculture production has been stagnant. There are some successful stories in the EU aquaculture (STECF, 2012). However, overall, aquaculture in the European Union has not come up with new species that have “taken off” in the way that was the case, for example, for salmon in Norway and Chile or pangasius in Vietnam. There may be several reasons for that (some of them reviewed STECF, 2012).

Successful development of aquaculture presupposes control with the biological production process. Beyond that, what may be called economic sustainability, namely profitable production over time, is required. This depends not only on the ”sale” price, but also on the cost of production. Considering the fierce competition

(foreign but also internal) and high labour and capital costs that the EU aquaculture sector bears, high value species are most relevant for EU producers. More than that, in view of the high costs, species of interest are those where productivity improvements can be achieved over time, giving rise to lower costs of production. This is an absolute necessity, because as production expands, price is bound to come down.

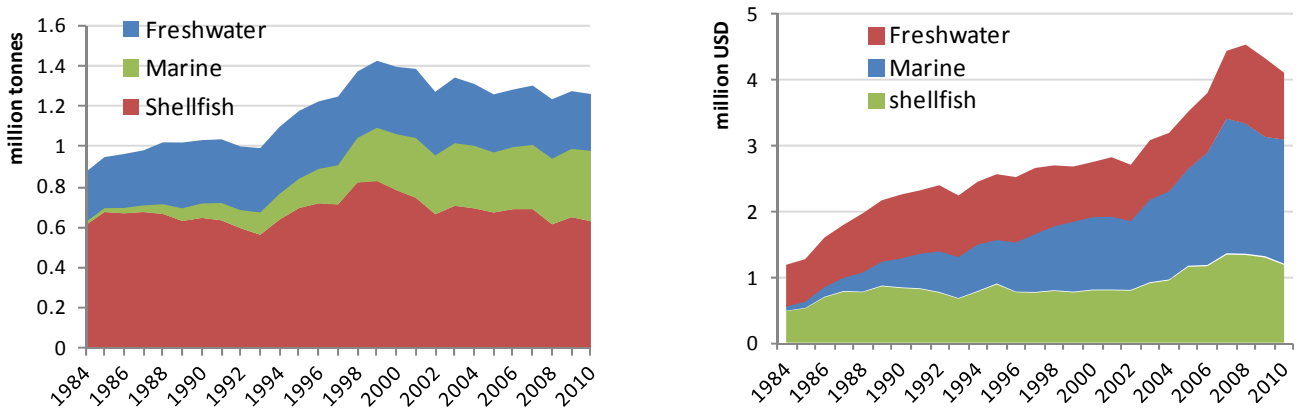
Moreover, governance takes on an important responsibility in the future of aquaculture. Positive important roles for governments include expediting the planning process for new farms (and farm extensions), as well as makings sites available. In addition, there is an important role for governments in terms of R&D.

Data for 2010 show an improvement in the economic performance of the EU aquaculture sector from the beginning of the economic crisis (2008-2009). However, the future evolution of the EU aquaculture is rather uncertain. The aquaculture sector has to face a fierce foreign competition that brings market prices down, high labour and capital costs and administrative burdens that slow down investments in the sector, hindering the full potential of the EU aquaculture sector.

4 The Structure of the sector

In 2010, marine fishes accounted for 28 % of the EU aquaculture production in weight, freshwater fishes accounted for 22 % and shellfish for 50 %. While in value terms marine fishes accounted for 46 % of the EU aquaculture production, freshwater fishes accounted for 25 % and shellfish for 29 %. The evolution of the EU aquaculture production in weight and value terms is represented in figure 4.1.

Figure 4.1 EU (27) aquaculture production in weight and value by subsector: 1984-2010.



In 2010, the main aquaculture species produced in value terms in the EU (27) were mussels (471 thousand tonnes, 37 % of all production), rainbow trout (193 thousand tonnes, 15 % of all production), Atlantic salmon (171 thousand tonnes, 14 %), Pacific cupped oysters (104 thousand tonnes, 8 %), gilthead seabream (88 thousand tonnes, 7 %), common carp (66 thousand tonnes, 5 %) and European seabass (54 thousand tonnes, 4 %). This species constituted more than 90 % of the total EU aquaculture production (FAO).

Mussels are the main aquaculture production in the EU. There are mainly two species cultured in Europe: the blue mussels and the Mediterranean mussel. Spain is the largest mussel producer in Europe with 40 % of the production, followed by Italy (14 %), France (13 %) and the Netherlands (12 %).

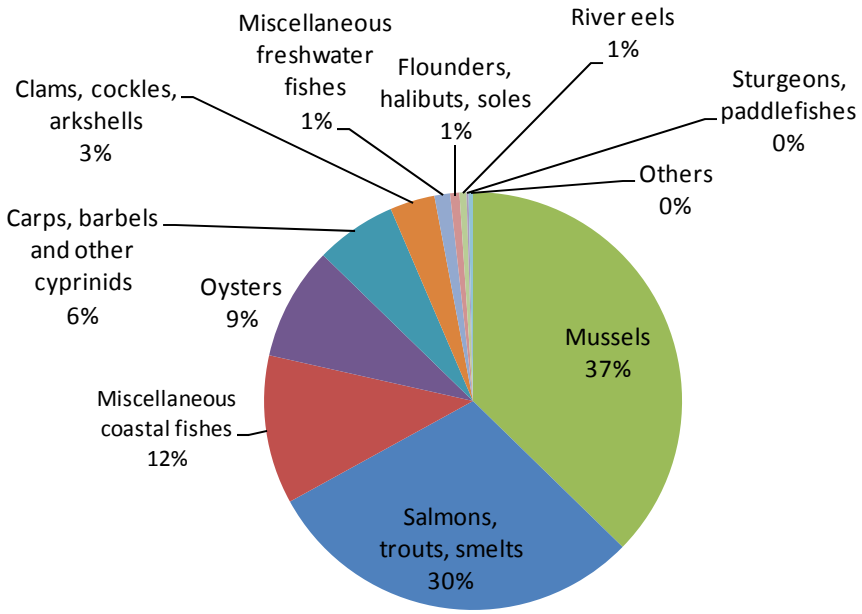
Salmon is the second species mot produced by the EU aquaculture sector with 170 thousand tonnes. It is mostly produced in the United Kingdom, with more than 90 % of the production and Ireland 9 % in 2010. The production from other countries is currently just testimonial.

The EU aquaculture sector produced about 193 thousand tonnes of Rainbow trout. Its production is very widespread across European countries. The main producers are Denmark, Italy and France with 17 to 18 % percent each, followed by Germany (10 %), Spain (9 %), United kingdom and Poland both with 7 %, Finland (6 %) and Sweden (4 %).

Pacific cupped oysters are mostly produced in France (more than 91 % of the total EU aquaculture production). Gilthead seabreams are mostly produced in Greece (62 %) and Spain (23 %). Common carps are mostly produced

in Czech Republic (27 %), Poland (23 %), Hungary and Germany (15 % both). European seabasses are mostly produced in Greece (58 %), Spain (21 %) and Italy (12 %).

Figure 4.2 Production weight by species group: 2010.



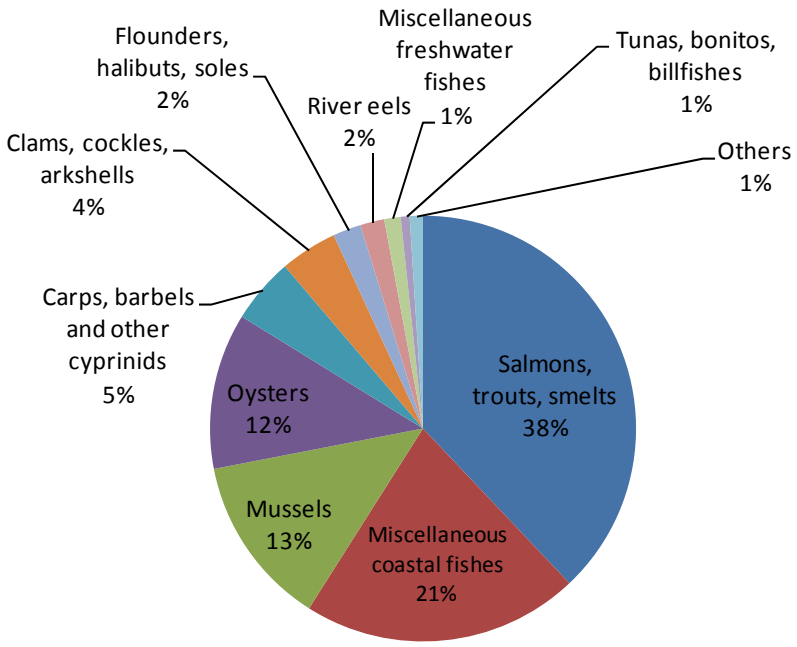
(Source: FAO)

In Figure 4.2 it can be seen the production weight by species groups dominated by mussels (37 %), salmonid species (mainly rainbow trout and Atlantic salmon, with 30 %), coastal fishes (including gilthead seabream and European seabass, with 12 %) and oysters (9 %). Therefore, 51 % of the total EU aquaculture production volume was fish and 49 % shellfish (mainly molluscs).

In 2010, the main aquaculture species produced in value in the EU (27) were Atlantic salmon (570 million Euros, 19 % of all EU production), rainbow trout (538 million Euros, 17 % of all EU production), mussels (402 million Euros, 13 %), gilthead seabream (358 million Euros, 12 %), Pacific cupped oysters (348 million Euros, 11 %), European seabass (276 million Euros, 9 %) and common carp (133 million Euros, 4 %). This species constituted more than 85 % of the total EU (27) aquaculture production in value (FAO) for 2010.

While in Figure 4.3 it can be seen the production value by species groups dominated by salmonid species (38 %), coastal fishes (21 %), mussels (13 %) and oysters (12 %). Therefore, 70 % of the total EU aquaculture production value was fish and 24 % shellfish (mainly molluscs) in 2010.

Figure 4.3 Production value by species group: 2010.



(Source: FAO)

4.1 Shellfish aquaculture

Shellfish aquaculture is a labour intensive segment, which faces limited environmental concerns. This sector contributes actively to external trade and has a very important social dimension given the high number of employed persons.

The most important costs of the EU shellfish aquaculture sector are labour and livestock costs. A large part of the employment is not performed under a formal contract. The workers are either the owners of the company or family members.

The total sales volume for the EU (27) aquaculture shellfish sector is estimated to be 0.72 million tonnes and the total value of sales (turnover) is estimated to be 1.12 billion Euros in 2010[24], as can be seen from table 4.1.

[24] DCF data on Total Sales Volume have been complemented with FAO production data to provide an overview of all 27 EU Member States.

Table 4.1 Economic indicators for the EU (27) aquaculture shellfish subsector

	Number of enterprises (number)	Total sales volume (tonne)	Turnover (thousand €)	Employment (number)	FTE (number)	Mean Wage (thousand €)
Austria	0	0	0	0	0	-
Belgium	0	0	0	0	0	-
Bulgaria	-	496	429	-	-	-
Cyprus	0	0	0	0	0	-
Czech Republic	0	0	0	0	0	-
Denmark	13	1,325	669	8	5	98.7
Estonia	0	0	0	0	0	-
Finland	0	0	0	0	0	-
France	2,930	267,515	703,157	17,731	9,501	24.5
Germany	8	4,985	4,126	12	9	120.7
Greece	-	22,511	11,312	-	-	-
Hungary	0	0	0	0	0	-
Ireland	268	29,446	38,577	1,454	737	13.4
Italy	-	101,025	136,440	-	-	-
Latvia	-	0	4	-	-	-
Lithuania	0	0	0	0	0	-
Luxembourg	0	0	0	0	0	-
Malta	0	0	0	0	0	-
Netherlands	-	60,185	73,504	-	-	-
Poland	-	6	18	-	-	-
Portugal	1,367	3,325	24,125	1,954	875	4.8
Romania	-	0	0	-	-	-
Slovakia	0	0	0	0	0	-
Slovenia	11	73	48	16	15	13.8
Spain	2,797	192,868	98,119	24,775	3,916	13.2
Sweden	37	1,384	798	58	17	21.5
United Kingdom	-	31,520	26,153	-	-	-
Total	*7,431*	*716,663*	*1,117,479*	*46,008*	*15,075*	*19.8*

= FAO source

= DCF source

Reported data (from 13 countries) shows the existence of more than 7.4 thousand companies in the EU aquaculture shellfish sector in 2010[25]. Companies had on average 6.2 employees (2.0 in FTE terms). Indeed, the

[25] Data are available for Cyprus, Denmark, Estonia, Finland, France, Germany, Ireland, Lithuania, Malta, Portugal, Slovenia, Spain, and Sweden. Cyprus, Estonia, Finland, Lithuania and Malta reported that shellfish aquaculture does not take place in their country. FAO data confirms that Austria, Czech Republic, Hungary, Luxembourg and Slovakia do not have shellfish aquaculture. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total. Available data correspond to 70 % of the total EU shellfish production in weight terms and 88 % in value terms.

majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2010, 90 % of the EU aquaculture shellfish companies in the EU were micro-enterprises.[26]

From the available data we estimate that the EU (27) aquaculture shellfish sector produces between 55 and 65 thousand direct employments[27]. The EU aquaculture shellfish sector has an important compound of part-time work, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 33 % in 2010. Available data show that women accounted for the 27 % of the EU aquaculture shellfish sector employments.

Available data (from 13 countries) suggest that the average wage (per FTE) for the EU aquaculture sector in 2010 was about 19,800 Euros per year[28]. There is an important variability on the wages in each country. The salaries varied from about 4,800 Euros per year in Portugal to 98,700 and 120,700 Euros per year in Denmark and Germany. This significant variability in the salaries for shellfish aquaculture by country corresponds in part to the estimation of unpaid labour and the use of different techniques, more capital intensive in Denmark and Germany. The unpaid labour is very important in the shellfish aquaculture. The imputed value of unpaid labour represents 50 % of the total wages.

[26] The companies with 5 or less employees represented in 2010 the 78.8 % of the EU aquaculture companies, followed by the companies with 6 to 10 employees that represented the 11.2 % and the companies with more than 10 employees represented 10.0 %.

[27] Data are available for Cyprus, Denmark, Estonia, Finland, France, Germany, Ireland, Lithuania, Malta, Portugal, Slovenia, Spain, and Sweden. However, reported data for Cyprus, Estonia, Finland, Lithuania and Malta state that shellfish aquaculture does not take place in their country. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total. By extrapolation data suggest that the EU (27) shellfish aquaculture sector must employ between 55 and 65 thousand persons.

[28] The average wage are calculated as the costs in wages and salaries costs plus the imputed value of unpaid labour divided by the total number of FTEs. Data are available for Denmark, France, Germany, Ireland, Portugal, Slovenia, Spain, and Sweden. Cyprus, Estonia, Finland, Lithuania and Malta reported that shellfish aquaculture does not take place in their country. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

Table 4.2 Economic Performance indicators for the EU (22) aquaculture shellfish subsector

	Gross Value Added (thousand €)	Earning before interest and tax (thousand €)	Return on Investment (%)	Labour productivity (thousand €)	Capital productivity (%)
Belgium	-	-	-	-	-
Bulgaria	-	-	-	-	-
Cyprus	0	0	-	-	-
Denmark	183	-449	-19.0	36.6	8.0
Estonia	0	0	-	-	-
Finland	0	0	-	-	-
France	399,878	135,896	13.9	44.6	41.0
Germany	2,546	364	3.0	282.9	22.0
Greece	-	-	-	-	-
Ireland	22,293	541	-0.2	30.3	21.0
Italy	-	-	-	-	-
Latvia	-	-	-	-	-
Lithuania	0	0	-	-	-
Malta	0	0	-	-	-
Netherlands	-	-	-	-	-
Poland	-	-	-	-	-
Portugal	22,733	18,440	-	26.0	-
Romania	-	-	-	-	-
Slovenia	1,437	1,248	115.0	96.5	133.0
Spain	64,871	11,290	7.0	16.6	42.0
Sweden	446	187	6.0	26.6	13.0
United Kingdom	-	-	-	-	-
Total	*514,388*	*167,517*	*12.0*	*35.4*	*39.6*

Available data (from 13 countries) report that the EU shellfish aquaculture sector provided in 2010 slightly more than 0.5 billion Euros in Gross Value Added[29].

Available data (from 13 countries) show that in 2010 the EU shellfish aquaculture sector has obtained profits, measured in EBIT terms, of more than 167.5 million Euros[30]. Moreover, for the 8 Member States that had

[29] Data are available for Cyprus, Denmark, Estonia, Finland, France, Germany, Ireland, Lithuania, Malta, Portugal, Slovenia, Spain and Sweden. However, reported data for Cyprus, Estonia, Finland, Lithuania and Malta state that shellfish aquaculture does not take place in their country. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

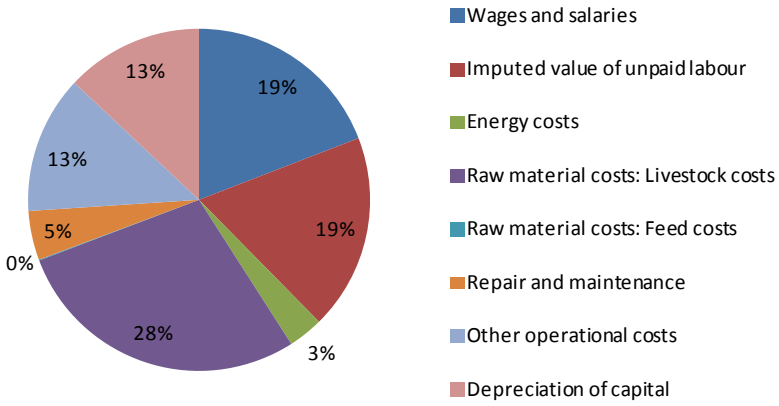
[30] Data are available for Cyprus, Denmark, Estonia Finland, France, Germany, Ireland, Lithuania, Malta, Portugal, Slovenia and Spain. Cyprus, Estonia, Finland, Lithuania and Malta reported that shellfish aquaculture does not take place in their country. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

shellfish aquaculture and reported data to calculate this indicator in 2010, only one of them had a negative profitability. The profitability measured in ROI terms was 12.0 % in 2010[31].

This positive result is into a large extent due to the high profitability of the French shellfish aquaculture. The ROI is higher than the profitability estimated by Guillen and Natale (2012), who estimated that the EBIT ratio increased from 3.2 % in 2009 to 3.3 % in 2010. The EBIT ratio (from the same 8 countries) in 2010 was 9.6 %.

Reported data (from 8 countries) shows that the labour productivity for the EU aquaculture shellfish sector was about 35,400 Euros per FTE in 2010[32]. Reported data (from 7 countries) shows that the capital productivity was about 39.6 % in 2010[33].

Figure 4.4 Costs breakdown for the EU shellfish aquaculture subsector



The most important costs of the EU shellfish aquaculture sector are the livestock costs, which represent 28 % of the total costs. While wages and salaries, and imputed value of unpaid labour both represent 19 % of the total

[31] Data are available for Denmark, France, Germany, Ireland, Slovenia, Spain and Sweden. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

[32] Data are available for Denmark, France, Germany, Ireland, Portugal, Slovenia, Spain and Sweden. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

[33] Data are available for Denmark, France, Germany, Ireland, Slovenia, Spain and Sweden. Data from Romania have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

costs. Hence, a large part of the employment in this sector is not done under a formal contract, but the workers are either the owners of the company or belong to the same family unit.

It is also important to notice that there are no feed costs. This occurs because the production is fed by the sea water itself, since mussels, clams and oyster are filtering organisms.

4.2 Marine (saltwater) aquaculture

Marine fish aquaculture is characterised by being generally capital intensive, with high input and high labour productivity. This segment has potential to compete on the increasingly globalised market but it faces constrains which hinder further expansion. Its environmental impacts are also generally higher than those of other aquaculture segments.

Table 4.3 Economic indicators for the EU (27) aquaculture saltwater subsector

	Number of enterprises (number)	Total sales volume (tonne)	Turnover (thousand €)	Employment (number)	FTE (number)	Mean Wage (thousand €)
Austria	0	0	0	0	0	-
Belgium	0	0	0	0	0	-
Bulgaria	0	0	0	0	0	-
Cyprus	-	4,034	20,005	-	-	-
Czech Republic	0	0	0	0	0	-
Denmark	-	11,252	35,335	-	-	-
Estonia	0	0	0	0	0	-
Finland	-	9,846	34,412	-	-	-
France	35	5,870	53,918	590	510	39.9
Germany	-	14	39	-	-	-
Greece	-	87,875	344,431	-	-	-
Hungary	0	0	0	0	0	-
Ireland	33	15,819	79,620	217	181	79.6
Italy	-	13,822	92,180	-	-	-
Latvia	0	0	0	0	0	-
Lithuania	0	0	0	0	0	-
Luxembourg	0	0	0	0	0	-
Malta	6	5,415	54,282	227	161	20.4
Netherlands	-	270	2,432	-	-	-
Poland	-	0	0	-	-	-
Portugal	79	2,524	16,066	317	305	13.5
Romania	0	0	0	0	0	-
Slovakia	0	0	0	0	0	-
Slovenia	-	42	208	-	-	-
Spain	100	41,555	306,192	2,313	1,773	36.0
Sweden	-	2,283	6,776	-	-	-
United Kingdom	-	309,692	523,089	-	-	-
Total	*253*	*510,312*	*1,568,985*	*3,664*	*2,931*	*35.8*

= FAO source

= DCF source

The total sales volume for the EU (27) marine aquaculture sector is estimated to be 0.51 million tonnes and the total value of sales (turnover) is estimated to be 1.57 billion Euros in 2010[34].

Available data (from 16 countries) reports more than 250 companies in the EU marine aquaculture sector in 2010[35]. Companies had on average 14.5 employees (11.6 in FTE terms). The majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2010, 87 % of the EU aquaculture marine companies in the EU were micro-enterprises[36].

From the available data we estimate that the EU (27) aquaculture marine sector produces about 5 thousand direct employments[37]. Part-time work is not so significant in the EU aquaculture marine sector, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 80 % in 2010. Available data show that women accounted for the 24 % of the EU aquaculture marine sector employments.

Available data (from 5 countries) suggest that the average wage (per FTE) for the EU aquaculture sector in 2010 was about 35,800 Euros per year[38]. There is an important variability on the wages in each country. The salaries varied from about 13,500 Euros per year in Portugal to 79,600 Euros per year in Ireland. The variability in the salaries can be explained by differences in the labour productivity and the capital and production intensity of the different techniques. The imputed value of unpaid labour is almost negligible in this sector since it only represents the 1.7 % of the total wages.

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[34] DCF data on Total Sales Volume have been complemented with FAO production data to provide an overview of all 27 EU Member States.

[35] Data are available for Bulgaria, Denmark, Estonia, France, Ireland, Latvia, Lithuania, Malta, Portugal, Romania, and Spain. Bulgaria, Estonia, Latvia, Lithuania and Romania reported that marine aquaculture does not take place in their country. FAO data confirms that Austria, Czech Republic, Hungary, Luxembourg and Slovakia do not have marine aquaculture. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total. Available data correspond to 70 % of the total EU marine production in weight terms and 88 % in value terms.

[36] The companies with 5 or less employees represented in 2010 the 73.9 % of the EU aquaculture companies, followed by the companies with more than 10 employees that represented the 13.2 % and the companies with 6 to 10 employees represented 13.0 %.

[37] Data are available for Bulgaria, Denmark, Estonia, France, Ireland, Latvia, Lithuania, Malta, Portugal, Romania, and Spain. Bulgaria, Estonia, Latvia, Lithuania and Romania reported that marine aquaculture does not take place in their country. FAO data confirms that Austria, Czech Republic, Hungary, Luxembourg and Slovakia do not have marine aquaculture. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total. By extrapolation data suggest that the EU 27 marine aquaculture sector must employ about 5 thousand persons.

[38] The average wage are calculated as the costs in wages and salaries costs plus the imputed value of unpaid labour divided by the total number of FTEs. Data are available for France, Ireland, Malta, Portugal and Spain. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

Table 4.4 Economic Performance indicators for the EU (22) aquaculture saltwater subsector

	Gross Value Added (thousand €)	Earning before interest and tax (thousand €)	Return on Investment (%)	Labour productivity (thousand €)	Capital productivity (%)
Belgium	0	0	-	-	-
Bulgaria	0	0	-	-	-
Cyprus	-	-	-	-	-
Denmark	-	-	-	-	-
Estonia	0	0	-	-	-
Finland	-	-	-	-	-
France	13,516	399	0.6	49.4	18.7
Germany	-	-	-	-	-
Greece	-	-	-	-	-
Ireland	24,562	9,175	15.0	138.6	40.0
Italy	-	-	-	-	-
Latvia	0	0	-	-	-
Lithuania	0	0	-	-	-
Malta	14,771	5,144	37.0	91.7	108.0
Netherlands	-	-	-	-	-
Poland	-	-	-	-	-
Portugal	-10,106	-19,028	-9.0	-33.8	-5.0
Romania	0	0	-	-	-
Slovenia	-	-	-	-	-
Spain	72,674	-11,187	-2.0	41.2	10.0
Sweden	-	-	-	-	-
United Kingdom	-	-	-	-	-
Total	*115,417*	*-15,497*	*-1.3*	*43.0*	*10.4*

Available data (from 11 countries) report that the EU marine aquaculture sector provided in 2010 more than 115 million Euros in Gross Value Added[39].

Available data (from 11 countries) show that in 2010 the EU marine aquaculture sector has obtained losses, measured in EBIT terms, of almost 15.5 million Euros[40]. The economic performance was negative in 2010 due to the economic losses in Spain and Portugal. The other 3 Member States that had marine aquaculture and reported data to calculate this indicator in 2010 had profits. However, the overall profitability measured in ROI

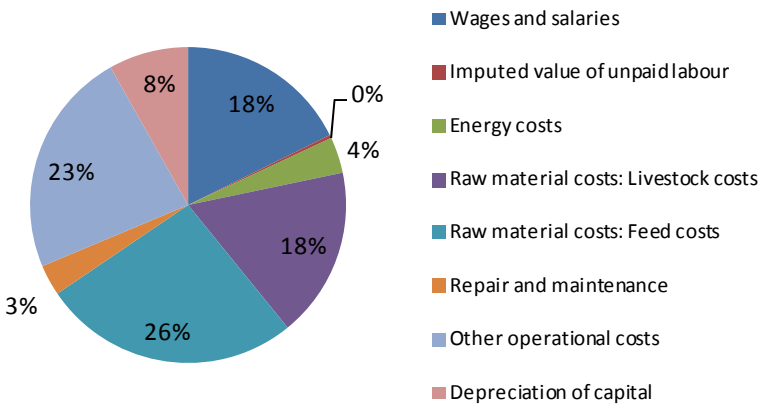
[39] Data are available for Bulgaria, Denmark, Estonia, France, Ireland, Latvia, Lithuania, Malta, Portugal, Romania, and Spain. Bulgaria, Estonia, Latvia, Lithuania and Romania reported that marine aquaculture does not take place in their country. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

[40] Data are available for Bulgaria, Denmark, Estonia, France, Ireland, Latvia, Lithuania, Malta, Portugal, Romania, and Spain. Bulgaria, Estonia, Latvia, Lithuania and Romania reported that marine aquaculture does not take place in their country. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

terms remains negative at -1.3 % in 2010[41]. The EBIT ratio (from the same 5 countries) was also negative in 2010 at -1.5 %. However, Guillen and Natale (2012) estimated that the EBIT ratio for the marine aquaculture sector increased from 5.2 % in 2009 to 7.0 % in 2010.

Reported data (from 5 countries) shows that the labour productivity for the EU aquaculture marine sector is above the EU aquaculture average with 43,000 Euros per FTE in 2010[42]. Reported data (from 5 countries) shows that the capital productivity was about 10.4 % in 2010[43].

Figure 4.5 Costs breakdown for the EU saltwater aquaculture subsector



The most important costs of the EU marine aquaculture sector are the feed costs, which represent 26 % of the total costs, followed by other operational costs (23 %), livestock costs (18 %) and wages and salaries (18 %). It is important to notice that the null importance of imputed value of unpaid labour, because most of the work is done under formal contracts.

[41] Data are available for France, Ireland, Malta, Portugal and Spain. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

[42] Data are available for France, Ireland, Malta, Portugal and Spain. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

[43] Data are available for France, Ireland, Malta, Portugal and Spain. Data from Slovenia have not been reported due to confidentiality issues. Data from Italy have not been included because they do not refer to the national total.

4.3 Freshwater aquaculture

This segment is often characterized by low labour productivity and low capital intensity, serving mainly local markets (e.g. carp). In this category limited demand and strong international competition is limiting the profitability and growth of production, however the extensive and artisanal production may play a role in environmental and recreational aspects (e.g. regarding biodiversity and preserving cultural landscapes).

The total sales volume for the EU (27) freshwater aquaculture sector is estimated to be 0.31 million tonnes and the total value of sales (turnover) is estimated to be 0.91 billion Euros in 2010.

Table 4.5 Economic indicators for the EU (27) aquaculture freshwater subsector

	Number of enterprises (number)	Total sales volume (tonne)	Turnover (thousand €)	Employment (number)	FTE (number)	Mean Wage (thousand €)
Austria	-	2,167	20,356	-	-	-
Belgium	-	539	3,361	-	-	-
Bulgaria	-	3,252	9,172	-	-	-
Cyprus	-	70	521	-	-	-
Czech Republic	-	20,420	41,179	-	-	-
Denmark	139	40,425	133,783	418	280	72.6
Estonia	11	488	1,441	30	21	13.2
Finland	234	12,879	50,320	359	290	37.3
France	333	39,953	125,516	1,493	1,118	19.5
Germany	-	35,695	89,856	-	-	-
Greece	-	3,100	11,025	-	-	-
Hungary	-	14,245	28,121	-	-	-
Ireland	12	1,166	4,352	48	38	31.2
Italy	-	38,640	104,619	-	-	-
Latvia	-	549	1,050	-	-	-
Lithuania	-	3,191	6,267	-	-	-
Luxembourg	0	0	0	0	0	-
Malta	0	0	0	0	0	-
Netherlands	-	6,490	31,188	-	-	-
Poland	-	30,757	67,519	-	-	-
Portugal	13	669	1,555	48	48	12.6
Romania	443	12,854	31,152	3,932	3,932	2.8
Slovakia	-	687	1,869	-	-	-
Slovenia	-	659	1,923	-	-	-
Spain	169	17,929	65,056	819	687	23.6
Sweden	138	10,338	40,397	341	213	29.2
United Kingdom	-	16,204	37,368	-	-	-
Total	*1,492*	*313,366*	*908,966*	*7,488*	*6,627*	*13.4*

= FAO source

= DCF source

Available data show that the labour productivity in freshwater aquaculture is almost half the value of the marine segment. However, the economic performance of the freshwater aquaculture was better than in the marine.

Available data (from 11 countries) reports almost than 1,500 companies in the EU freshwater aquaculture sector in 2010[44]. Companies had on average 5.0 employees (4.4 in FTE terms). The majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2010, 88 % of the EU aquaculture freshwater companies in the EU were micro-enterprises[45].

From the available data we estimate that the EU (27) aquaculture freshwater sector produces more than 10 thousand direct employments[46]. The EU aquaculture freshwater sector has an important compound of part-time work, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 89 % in 2010. Available data show that women accounted for the 29 % of the EU aquaculture freshwater sector employments.

Available data (from 9 countries) suggest that the average wage (per FTE) for the EU aquaculture sector in 2010 was about 13,400 Euros per year[47]. There is an important variability on the wages in each country. The salaries varied from about 2,800 Euros per year in Romania to 72,600 Euros per year in Denmark. The variability per in the freshwater aquaculture by country corresponds in part to the use of different techniques, more capital and product intensive in Denmark. The unpaid labour is almost negligible in the freshwater aquaculture, since the imputed value of unpaid labour represents 11 % of the total wages.

[44] Data are available for Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania Spain and Sweden. Malta reported that there is no freshwater aquaculture in their country; while FAO data confirm that Luxembourg does not have freshwater aquaculture. Data from Italy have not been included because they do not refer to the national total. Available data correspond to 44 % of the total EU production in weight terms and 67 % in value terms.

[45] The companies with 5 or less employees represented in 2010 the 74.8 % of the EU aquaculture companies, followed by the companies with 6 to 10 employees that represented the 13.7 % and the companies with more than 10 employees represented 11.6 %.

[46] Data are available for Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania Spain and Sweden. Malta reported that there is no freshwater aquaculture in their country; while FAO data confirms Luxembourg does not have freshwater aquaculture. Data from Italy have not been included because they do not refer to the national total. By extrapolation data suggest that the EU 27 freshwater aquaculture sector must employ more than 10 thousand persons.

[47] The average wage are calculated as the costs in wages and salaries costs plus the imputed value of unpaid labour divided by the total number of FTEs. Data are available for Denmark, Estonia, Finland, France, Ireland, Portugal, Romania Spain and Sweden. Data from Italy have not been included because they do not refer to the national total.

Table 4.6 Economic Performance indicators for the EU (22) aquaculture freshwater subsector

	Gross Value Added	Earning before interest and tax	Return on Investment	Labour productivity	Capital productivity
	(thousand €)	(thousand €)	(%)	(thousand €)	(%)
Belgium	-	-	-	-	-
Bulgaria	-	-	-	-	-
Cyprus	-	-	-	-	-
Denmark	34,310	7,082	4.0	122.5	20.0
Estonia	687	314	7.0	32.7	14.0
Finland	16,483	3,971	5.0	56.8	22.0
France	33,230	6,400	6.0	29.7	29.0
Germany	-	-	-	-	-
Greece	-	-	-	-	-
Ireland	816	-831	-10.0	21.4	9.0
Italy	-	-	-	-	-
Latvia	-	-	-	-	-
Lithuania	-	-	-	-	-
Malta	0	0	-	-	-
Netherlands	-	-	-	-	-
Poland	-	-	-	-	-
Portugal	427	-224	-8.0	8.9	16.0
Romania	13,039	-1,826	-	3.3	3.0
Slovenia	-	-	-	-	-
Spain	20,017	4,231	8.0	51.6	37.0
Sweden	11,544	4,210	9.0	54.1	26.0
United Kingdom	-	-	-	-	-
Total	*130,553*	*23,327*	*2.7*	*19.7*	*14.9*

Available data (from 10 countries) report that the EU freshwater aquaculture sector provided in 2010 slightly more than 130 million Euros in Gross Value Added[48].

Available data (from 10 countries) show that in 2010 the EU freshwater aquaculture sector has obtained profits, measured in EBIT terms, of more than 23.3 million Euros[49]. Moreover, for the 9 Member States that had freshwater aquaculture and reported data to calculate this indicator in 2010, three countries (Ireland, Portugal and Romania) had a negative profitability. The overall profitability measured in ROI terms was 2.7 % in 2010[50];

[48] Data are available for Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania Spain and Sweden. Malta reported that there is no freshwater aquaculture in their country. Data from Italy have not been included because they do not refer to the national total.

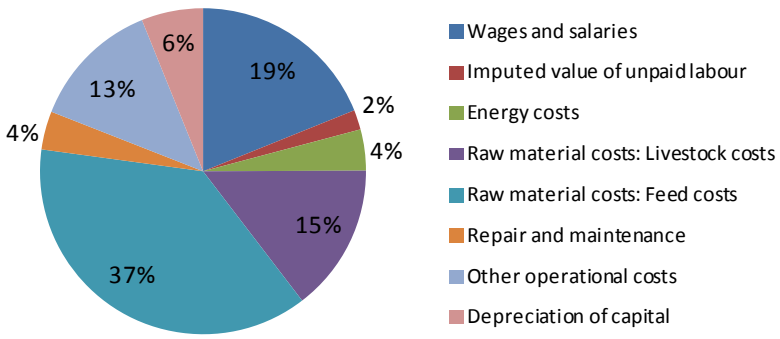
[49] Data are available for Denmark, Estonia, Finland, France, Ireland, Malta, Portugal, Romania Spain and Sweden. Malta reported that there is no freshwater aquaculture in their country. Data from Italy have not been included because they do not refer to the national total.

[50] Data are available for Denmark, Estonia, Finland, France, Ireland, Portugal, Romania Spain and Sweden. Data from Italy have not been included because they do not refer to the national total.

while measured with the EBIT ratio (from the same 9 countries) in 2010 was 2.6 %. Guillen and Natale (2012) estimated that the EBIT ratio increased for the freshwater sector from 4.8 % in 2009 to 6.5 % in 2010.

Reported data (from 9 countries) shows that the labour productivity for the EU freshwater aquaculture sector was about 19,700 Euros per FTE in 2010[51]. Reported data (from 9 countries) shows that the capital productivity was about 14.9 % in 2010[52].

Figure 4.6 Costs breakdown for the EU freshwater aquaculture sub-sector



The most important costs of the EU freshwater aquaculture sector are the feed costs, which represent 27 % of the total costs, followed by wages and salaries (19 %) and livestock costs (15 %).It should be also noticed the almost null importance of imputed value of unpaid labour on freshwater aquaculture (represent only 2% of the total costs), since only 11 % of the labour it is not carried out a formal contract.

[51] Data are available for Denmark, Estonia, Finland, France, Ireland, Portugal, Romania Spain and Sweden. Data from Italy have not been included because they do not refer to the national total.

[52] Data are available for Denmark, Estonia, Finland, France, Ireland, Portugal, Romania Spain and Sweden. Data from Italy have not been included because they do not refer to the national total.

5 National Chapters

5.1 AUSTRIA

5.1.1 Overview of the sector

The Austrian aquaculture sector produced 2.2 thousand tonnes in 2010. This production was valued 20.4 million Euros (FAO, 2012). All aquaculture production is freshwater, because it is a landlocked country.

Table 5.1.1 Production weight and value of the Austrian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (thousand tonnes)	2.1	2.1	2.2
production value (million €)	12.7	13.9	20.4

(source: FAO, 2012)

Rainbow trout was the main species produced in 2010, with 55 % of the total production in weight and 56 % in value. Other important species are common carp and brook trout, representing 16 % and 12 % of total weight of production and 11 % and 16 % of total value of production, respectively.

Table 5.1.2 Top 5 species by aquaculture production weight and value in Austria: 2010.

	production volume (tonnes)
Species	
Rainbow trout	1211
Common carp	348
Brook trout	256
Wels (=Som) catfish	151
Sea trout	85

	production value (thousand €)
Species	
Rainbow trout	11327
Brook trout	3206
Common carp	2179
Wels (=Som) catfish	1253
Sea trout	1064

(source: FAO, 2012)

5.2 BELGIUM

5.2.1 Overview of the sector

The Belgian aquaculture sector produced 539 tonnes in 2010. This production was valued 3.36 million Euros (FAO, 2012). Most of Belgian aquaculture production is freshwater. Belgium did not submit aquaculture data under the DCF regulation because the low response rate of their survey led to confidentiality issues on its results.

Table 5.2.1 Production weight and value of the Belgian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	0.1	0.6	0.5
production value (million €)	0.7	2.7	3.4

(source: FAO, 2012)

The main aquaculture production in Belgium is based on miscellaneous freshwater fishes and aquatic invertebrates (FAO, 2012).

Table 5.2.2 Top 5 species by aquaculture production weight and value in Belgium: 2010 (source: FAO, 2012).

	production volume (tonnes)
Species	
Aquatic invertebrates nei	300
Freshwater fishes nei	200
Rainbow trout	39

	production value (thousand €)
Species	
Aquatic invertebrates nei	2000
Freshwater fishes nei	1192
Rainbow trout	169

(source: FAO, 2012)

5.3 BULGARIA

5.3.1 Overview of the sector

Bulgarian aquaculture sector comprised 336 companies in 2009 and 347 in 2010. The number of companies augmented in 11 from 2009, corresponding to a 3 % increase. The companies are located all around the country, as private companies. The number of employees in FTE terms decreased in a -84 % , from 1,157 in 2009 to at a total of 218 in 2010. The aquaculture is not a big sector comparing to other ones at national level, amounting 9.6 million Euros in 2010 with an increase of 14 % comparing to 2009 which was 8.4 million Euros, as can be seen from Table 5.3.1.

Table 5.3.1 Sector overview for Bulgaria: 2008-2010.

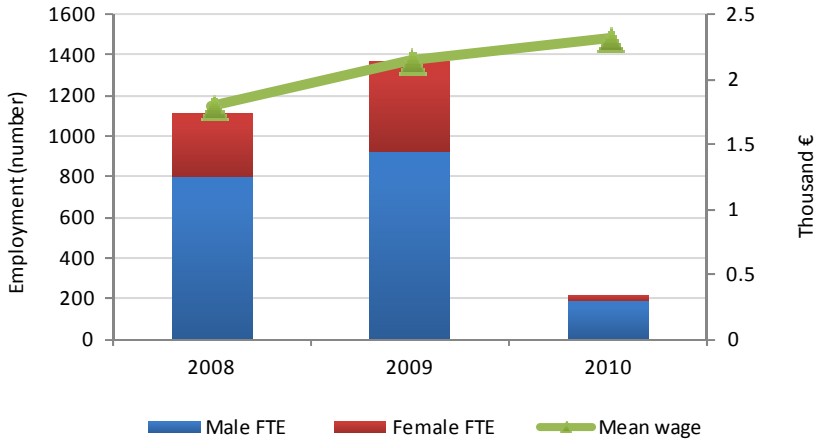
	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*274*	*336*	*347*	*3%*
<= 5 employess	241	316	339	7%
6-10 employess	25	13	4	-69%
> 10 employees	8	7	4	-43%
Employment (number)				
Total employees	*1100*	*1375*	*218*	*-84%*
Male employees	801	930	187	-80%
Female employees	309	445	31	-93%
FTE	*1100*	*1375*	*218*	*-84%*
Male FTE	801	930	187	-80%
Female FTE	309	445	31	-93%
Input & Production (thousand tonnes)				
Raw material volume: Feed	7.2	9.3	10.8	15%
Raw material volume: Livestock	7.2	7.9	9.7	23%
Production volume	2.9	3.4	3.7	9%
Indicators				
FTE per enterprices	4.0	4.1	0.6	-85%
Average wage (thousand €)	1.8	2.1	2.3	8%
Labour productivity (thousand €)	-12.6	-11.7	34.4	394%

Income and production value are very different, FTE has decreased dramatically, expenses have decreased in 2010 compared with 2009. Livestock costs are twice higher than turnover only for 2008 and 2009, while for 2010

is lower. The debt increased between 2008 and 2009. It could be possible that owners purchased “Livestock” by credit. The indicators “Capital productivity” and “Return on Investment” for 2010 are very good. The bad results for 2008 and 2009 could be explained because the fish are fattened at least three years and then farmers sold them on the market.

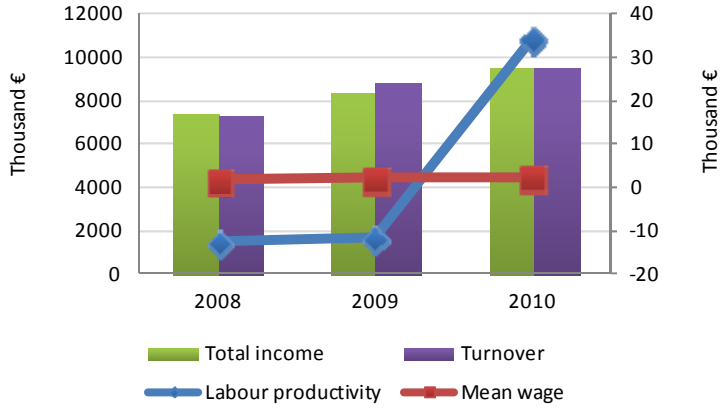
Sales increased by 1 %, from 3.4 tons in 2009, to 3.7 tons in 2010. Aquaculture is a fresh water land based and the main segments correspond to fresh water species such as carp, Asian cyprinids combined, trout farms and other fresh water species. A segment that has lately achieved considerable growth is the new farms of sturgeons, developed with the EFF fund in the last 3 years.

Figure 5.3.1 Bulgaria employment trends: 2008-2010.



The number of employees in FTE terms decreased in a -84 %, from 1,157 in 2009 to at a total of 218 in 2010.

Figure 5.3.2 Bulgarian income, wages and labour productivity trends: 2008-2010.



Labour productivity increased as a result of the reduction in the number of FTEs.

Table 5.3.2 Economic performance for Bulgaria: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	7.4	99%	8.8	105%	9.6	100%	9%
Other income	0.0	0%	0.0	0%	0.0	0%	
Subsidies	0.0	0%	0.0	0%	0.0	0%	
Total income	*7.4*	*100%*	*8.4*	*100%*	*9.6*	*100%*	*14%*
Expenditure (million €)							
Wages and salaries	1.8	25%	2.5	29%	0.4	4%	-83%
Imputed value of unpaid labour	0.1	2%	0.5	6%	0.1	1%	-81%
Energy costs	0.4	5%	0.4	5%	0.1	1%	-84%
Repair and maintenance	0.4	5%	0.4	5%	0.2	2%	-65%
Raw material costs: Feed costs	3.0	40%	3.5	42%	1.5	16%	-57%
Raw material costs: Livestock costs	16.5	222%	19.5	232%	0.3	3%	-98%
Other operational costs	1.0	14%	1.0	12%	0.1	1%	-92%
Total operating costs	*23.2*	*313%*	*27.8*	*330%*	*2.6*	*27%*	*-91%*
Capital Costs (million €)							
Depreciation of capital	0.6	8%	0.7	8%	0.3	3%	-62%
Financial costs, net	1.6	22%	1.5	18%	0.2	2%	-86%
Extraordinary costs, net	0.2	2%	0.2	3%	0.0	0%	-86%
Capital value (million €)							
Total value of assets	38.2	514%	26.0	308%	6.6	69%	-74%
Net Investments	5.3	71%	1.5	18%	0.8	8%	-49%
Debt	28.2	379%	35.9	426%	2.0	21%	-94%
Performance Indicators (million €)							
Gross Value Added	-13.9	-187%	-16.1	-190%	7.5	78%	147%
Operating Cash Flow	-15.8	-213%	-19.4	-230%	7.0	73%	136%
Earning before Interest and Tax	-16.4	-221%	-20.1	-239%	6.7	70%	133%
Net Profit	-18.0	-243%	-21.6	-257%	6.5	68%	130%
Capital Productivity (%)	-36.3		-61.9		113.2		
Return on Investments (%)	-43.0		-77.5		101.5		
Financial position (%)	26.4		-38.4		69.9		
Future Expectation Indicator (%)	12.3		3.2		7.8		

5.3.2 Structure and economic performance of the sector's main segments

The analysis of the costs structure for the whole sector, shows the highest share for raw material costs: livestock -10 % and feed costs -52 % corresponding to an extensive technology used for base land aquaculture. This could be one of the causes to explain the general inefficiency of the sector.

Table 5.3.3 Economic performance for Bulgaria at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Carp combined							
Total Income (million €)	1.2	100%	1.3	100%	1.1	100%	-15%
Gross Value Added (million €)							
Operating Cash Flow (million €)							
Earning before Investments & tax (million €)							
Net Profit (million €)							
Volume of sales (thousand tonnes)	1.6		0.5		0.7		46%
Trout cages							
Total Income (million €)	2.7	100%	3.7	100%	3.9	100%	7%
Gross Value Added (million €)							
Operating Cash Flow (million €)							
Earning before Investments & tax (million €)							
Net Profit (million €)							
Volume of sales (thousand tonnes)	1.4		1.8		1.1		-36%
Trout combined							
Total Income (million €)	1.9	100%	2.3	100%	2.6	100%	13%
Gross Value Added (million €)							
Operating Cash Flow (million €)							
Earning before Investments & tax (million €)							
Net Profit (million €)							
Volume of sales (thousand tonnes)	1.4		1.0		0.7		-23%

5.3.3 Trends and triggers

The lack of subsidies and the absence of innovative technology led to a generally inefficiency in the aquaculture sector.

Considering the economic difficulties in the sector, together with the general situation of the national economy, there are no big expectations for improvements in the economic performance of 2010 and 2011.

Analysis of the data in 2010 shows a reduction in the employment in the aquaculture sector while increasing the quantities of fish sold, which leads to an increase in labour productivity in the sector.

In recent years we have increased performance of European Fisheries Fund for modernization, reconstruction and construction of new fish farms in Bulgaria. Therefore in the coming years, we expect higher economic indicators.

In 2010, the annual consumption of fish and fish products from the households increased by 10.4% over the previous year and amounted to 5.3 kg per capita. This amount is determined based on household survey carried out and the data not include quantities consumed in catering and restaurants.

Table 5.3.4: Consumption of fish and fish products per household member for Bulgaria

	2008	2009	2010
Products			
Fish and fish products (kg)	4.6	4.8	5.3

5.3.4 Data coverage and Data Quality

The comparison of the employment and number of companies evolution rises some uncertainties on the quality of the data. One reason to explain this divergences is that current data is obtained from different surveys.

Despite the basic data availability, data quality and coverage should be improved, in order to assure consistency with other official data sources (Eurostat) on value and volume. Especially by providing detailed data at the segment level.

5.4 CYPRUS

5.4.1 Overview of the sector

During 2010, nine aquaculture companies operated in Cyprus. Sales volume recovered after 15 % drop in 2009 and reached about 4 thousand tonnes, while the turnover increased by 15 % in 2010 and reached 22.7 million Euros. Increased turnover is likely to reflect the upward trend of seabream and seabass prices in 2010.

Seabass and seabream are the main species produced in Cyprus, while Bluefin tuna fattening in cage farms was stopped in 2008, causing the drop in turnover by 38 % in 2009.

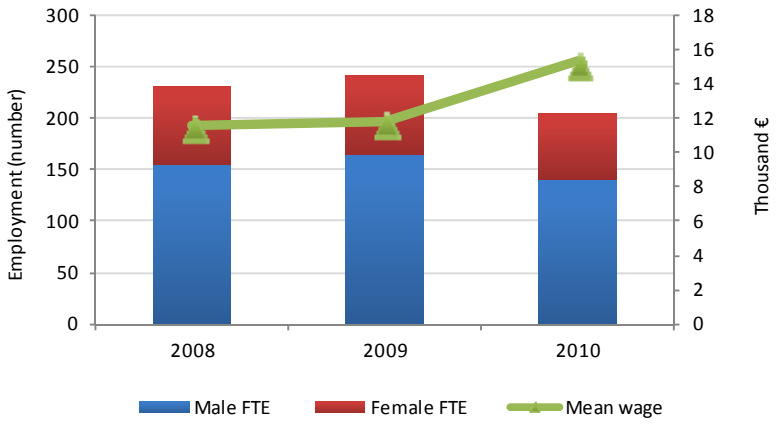
The structure of the sector and main production indicators are presented in the table below.

Table 5.4.1 Sector overview for Cyprus: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*9*	*12*	*9*	*-25%*
<= 5 employess	2	4	3	-25%
6-10 employess	2	1	1	0%
> 10 employees	5	7	5	-29%
Employment (number)				
Total employees	*137*	*133*	*116*	*-13%*
Male employees	117	108	103	-5%
Female employees	20	25	13	-48%
FTE	*228*	*243*	*204*	*-16%*
Male FTE	156	165	141	-14%
Female FTE	75	78	64	-19%
Input & Production (thousand tonnes)				
Raw material volume: Feed	11.2	8.6	9.3	8%
Raw material volume: Livestock	11767.6	12479.4	11450.9	-8%
Production volume	3.9	3.3	4.0	19%
Indicators				
FTE per enterprices	25.3	20.2	22.7	12%
Average wage (thousand €)	11.5	11.8	15.4	30%
Labour productivity (thousand €)	64.1	30.7	47.3	54%

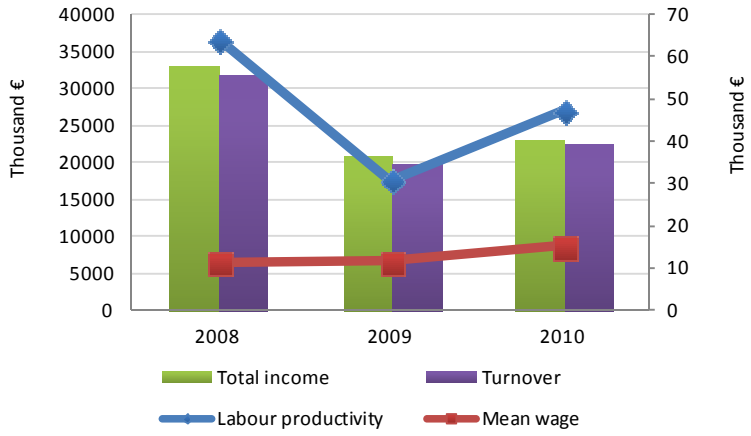
As the number of enterprises decreased in 2010, employment also decreased by 16 % in terms of FTE. The increase of turnover in 2010 as well as decrease of employment leaded the increase of average wage by 30 % as well as increase of labour productivity by 54 %.

Figure 5.4.1 Cyprus employment trends: 2008-2010.



Although turnover and total income increased by 15 % and 11 % during 2010, respectively, both remain at approximately 70 % of 2008.

Figure 5.4.2 Cyprus income, wage and labour productivity trends: 2008-2010.



As production is dominated by seabream and seabass, feed cost is the most important component of the cost structure (38 %), followed by wage-salaries costs (11 %) and other operational costs (9 %).

While total value of assets increased by 3 % during 2010, net investment decreased by 44 %. The future expectation indicator is also showing the negative trends in investing behaviour.

Performance indicators suggest that aquaculture is an overall profitable sector in Cyprus.

Table 5.4.2 Economic performance for Cyprus: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	32.1	96%	19.8	95%	22.7	98%	15%
Other income	0.4	1%	0.5	2%	0.4	2%	-29%
Subsidies	0.8	2%	0.6	3%	0.2	1%	-67%
Total income	*33.4*	*100%*	*21.0*	*100%*	*23.3*	*100%*	*11%*
Expenditure (million €)							
Wages and salaries	2.6	8%	2.9	14%	2.5	11%	-14%
Imputed value of unpaid labour	0.0	0%	0.0	0%	0.7	3%	
Energy costs	0.3	1%	0.4	2%	0.4	2%	-7%
Repair and maintenance	0.3	1%	0.0	0%	0.3	1%	67281%
Raw material costs: Feed costs	9.6	29%	7.4	35%	8.8	38%	19%
Raw material costs: Livestock costs	6.4	19%	3.5	17%	1.7	7%	-51%
Other operational costs	1.3	4%	1.6	7%	2.2	9%	39%
Total operating costs	*20.5*	*62%*	*15.8*	*75%*	*16.6*	*71%*	*5%*
Capital Costs (million €)							
Depreciation of capital	0.6	2%	0.0	0%	1.0	4%	9708%
Financial costs, net	0.2	1%	0.3	1%	0.2	1%	-20%
Extraordinary costs, net	1.4	4%	1.4	7%	0.0	0%	-100%
Capital value (million €)							
Total value of assets	15.6	47%	35.5	169%	36.6	157%	3%
Net Investments	2.8	8%	2.6	12%	1.4	6%	-44%
Debt	3.1	9%	2.6	12%	4.0	17%	56%
Performance Indicators (million €)							
Gross Value Added	14.6	44%	7.4	36%	9.7	42%	30%
Operating Cash Flow	12.8	38%	5.2	25%	6.7	29%	30%
Earning before Interest and Tax	12.2	37%	5.2	25%	5.7	25%	11%
Net Profit	12.0	36%	4.9	23%	5.5	24%	12%
Capital Productivity	93.5		21.0		26.4		
Return on Investments (%)	78.1		14.6		15.7		
Financial position (%)	80.4		92.8		89.1		
Future Expectation Indicator (%)	14.0		7.2		1.2		

5.4.2 Structure and economic performance of the sector's main segments

Seabass and seabream production in cages is the main segment in Cyprus. However, data to estimate the economic performance by segment was not reported because of confidentiality issues due to the low number of firms.

5.4.3 Trends and triggers

The trends and triggers of the aquaculture sector in Cyprus could not be evaluated by the expert working group due to the lack of expertise in this particular country.

5.4.4 Data coverage and Data Quality

Cyprus provided all economic variables at the national level. However, because of confidentiality issues due to a low number of firms, only turnover and sales volume by specie were provided by segment.

A data resubmission from Cyprus has been received at a stage were the report was being edited, therefore, it has not been possible to include it on the final report. However, these data are provided on the electronic annexes. These data resubmission affects employment data, and so productivity figures, but does not affect economic performance results.

5.5 CZECH REPUBLIC

5.5.1 Overview of the sector

The Czech Republic aquaculture sector produced 20.4 thousand tonnes in 2010. This production was valued 41.2 million Euros (FAO, 2012). All aquaculture production is freshwater, since it is a landlocked country.

Table 5.5.1 Production weight and value of the Czech Republic aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	20395	20071	20420
production value (thousand €)	41538	39281	41179

(source: FAO, 2012)

Common carp was the main species produced in 2010, with 87 % of the total production in weight and 82 % in value.

Table 5.5.2 Top 5 species by aquaculture production weight and value in the Czech Republic: 2010.

	production volume (tonnes)
Species	
Common carp	17746
Grass carp (=White amur)	488
Rainbow trout	476
Bighead carp	391
Brook trout	292

	production value (thousand €)
Species	
Common carp	33933
Rainbow trout	1737
Northern pike	886
Grass carp (=White amur)	883
Brook trout	864

(source: FAO, 2012)

5.6 DENMARK

5.6.1 Overview of the sector

The main species produced in Denmark is rainbow trout, which makes up for 90 % of the total weight and value of production. The Danish aquaculture production is mainly located in the western part of Denmark (Jutland). The production in the land based farms is typically small portion size trout and the production techniques used are primarily ponds, tanks, raceways and recirculation systems. Denmark also has a production of larger size trout and trout eggs which is produced in sea cage farms. Furthermore, there is a minor production of European eel, pike-perch and turbot in land based recirculation farms. In Denmark, the production of blue mussel has been dominated by fishing vessels, but in recent years a minor production of blue mussel on long line has emerged.

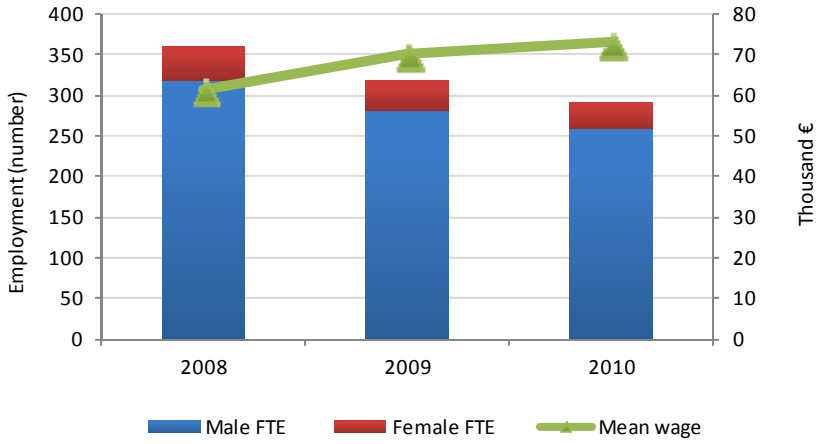
In 2010, there were 257 aquaculture farms, which were distributed on 154 enterprises. The Danish aquaculture sector is dominated by small enterprises with less than 5 employees. In total, the Danish farms produced 42,100 tons, which correspond to a decrease of 8 % from 2009 to 2010.

Table 5.6.1 Sector overview for Denmark: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*162*	*160*	*154*	*-4%*
<= 5 employess	146	141	135	-4%
6-10 employess	9	10	11	10%
> 10 employees	7	9	8	-11%
Employment (number)				
Total employees	*528*	*465*	*436*	*-6%*
Male employees	467	410	386	-6%
Female employees	61	55	50	-9%
FTE	*359*	*318*	*291*	*-8%*
Male FTE	318	281	258	-8%
Female FTE	41	37	33	-11%
Input & Production (thousand tonnes)				
Raw material volume: Feed	42.8	38.5	39.3	2%
Raw material volume: Livestock	7.3	11.2	9.5	-15%
Production volume	45.3	45.9	42.1	-8%
Indicators				
FTE per enterprices	2.2	2.0	1.9	-5%
Average wage (thousand €)	61.5	70.2	73.0	4%
Labour productivity (thousand €)	85.2	88.1	121.1	38%

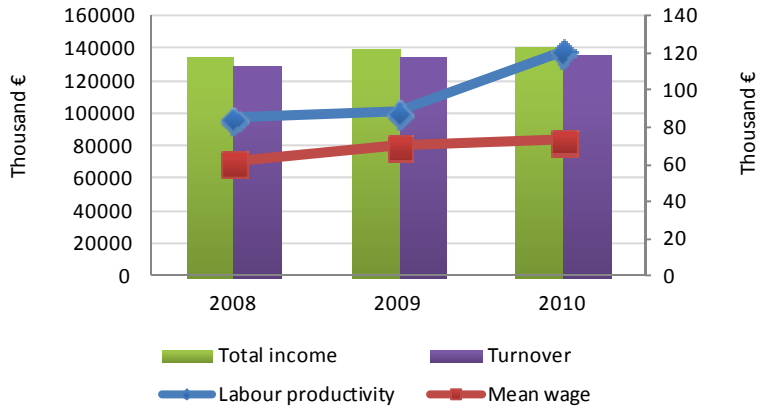
The total number of persons employed in the Danish aquaculture sector was 436, corresponding to 291 FTEs. From 2008 to 2010, the number of persons employment decreased by 17 %. Only 11 % of the full time employees in the sector were women. The average FTE per enterprise declined from 2.2 to 1.9, whereas the average wage increased from 61.5 to 73.0 thousand euros from 2008 to 2010.

Figure 5.6.1 Denmark employment trends: 2008-2010.



One reason that explains the increasing wages is that the farms leaving the sector are older traditional farms employing low skilled labour, whereas the farms staying in the sector are the more advanced farms using the new recirculation technology requiring highly skilled labour with higher wages. Even though wages have been increasing, the labour productivity measured as gross value added per full time employee has increased by 42 % from 2008 to 2010.

Figure 5.6.2 Danish income, wages and labour productivity trends: 2008-2010.



The total weight of sales (production) from the aquaculture sector was 42,100 tonnes in 2010, corresponding to a total income of 141 million Euros. From 2008 to 2010, the total weight decreased by 7 %, whereas the turnover increased by 5 %.

From 2009 to 2010, the total income increased by 1 %, while the operational cost decreased by 6%. The gross value added increased by 26 % and both EBIT and net profit were positive. The total value of assets decreased by 7 %, which can be explained by the falling number of farms in the sector.

Table 5.6.2 Economic performance for Denmark: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	130.0	96%	135.0	96%	136.1	97%	1%
Other income	4.8	4%	5.2	4%	4.8	3%	-7%
Subsidies	0.0	0%	0.0	0%	0.0	0%	
Total income	*134.8*	*100%*	*140.1*	*100%*	*140.9*	*100%*	*1%*
Expenditure (million €)							
Wages and salaries	18.4	14%	17.8	13%	17.3	12%	-3%
Imputed value of unpaid labour	3.7	3%	4.5	3%	3.9	3%	-13%
Energy costs	6.4	5%	6.8	5%	6.5	5%	-4%
Repair and maintenance	12.3	9%	11.8	8%	12.1	9%	3%
Raw material costs: Feed costs	45.7	34%	43.3	31%	41.3	29%	-5%
Raw material costs: Livestock costs	24.1	18%	34.9	25%	32.0	23%	-9%
Other operational costs	15.7	12%	15.3	11%	13.8	10%	-10%
Total operating costs	*126.3*	*94%*	*134.5*	*96%*	*126.9*	*90%*	*-6%*
Capital Costs (million €)							
Depreciation of capital	6.5	5%	7.9	6%	7.2	5%	-8%
Financial costs, net	7.0	5%	6.1	4%	6.5	5%	7%
Extraordinary costs, net	-0.2	0%	-0.2	0%	-0.4	0%	-93%
Capital value (million €)							
Total value of assets	193.8	144%	188.1	134%	175.7	125%	-7%
Net Investments	13.1	10%	7.9	6%	9.1	6%	14%
Debt	152.6	113%	151.1	108%	175.7	125%	16%
Performance Indicators (million €)							
Gross Value Added	30.6	23%	28.0	20%	35.2	25%	26%
Operating Cash Flow	8.5	6%	5.7	4%	14.0	10%	146%
Earning before Interest and Tax	2.0	1%	-2.2	-2%	6.7	5%	406%
Net Profit	-5.0	-4%	-8.3	-6%	0.2	0%	103%
Capital Productivity	15.8		14.9		20.1		
Return on Investments (%)	1.0		-1.2		3.8		
Financial position (%)	21.3		19.7		0.0		
Future Expectation Indicator (%)	3.4		0.0		1.0		

5.6.2 Structure and economic performance of the sector's main segments

In Denmark, the aquaculture production is divided into four segments based on the species produced and the techniques used. The main species produced in Denmark is rainbow trout. The production weight was 38,800 tonnes with a corresponding income of 127 million Euros, in 2010. The trout production is divided into two segments based on technique and production environment.

The techniques used in the land based trout farms (Trout combined) are ponds, raceways and recirculation system, which mainly produce small portion size trout. The segment consists of 124 enterprises running 209 farms and the production weight accounts for 74 % of the total trout production. The production weight was 28,800 tonnes with a corresponding income of 80 million Euros.

Sea cage trout farms (Trout cages) cover the last 26 % of the trout production, where the main product, besides the fish meat, is trout eggs. In 2010, there were 17 farms distributed among 6 enterprises. The production weight was 10,000 tonnes bringing about a total income of 47 million Euros. The sea cage farms are the only segment that has been apple to raise production from 2008 to 2010.

Denmark also has a minor land based production of other freshwater species (Other freshwater fish combined). The main species produced in this segment is European eel in land based recirculation farms. The eel production enterprises are depending on wild caught glass eel for production. There are 8 enterprises producing eel representing one farm each. In this segment there is also a minor production of pike-perch, turbot and salmon. The production technique is intensive recirculation where more than 95 % of the water is recirculated. The production weight was 1,600 tonnes with a corresponding income of 12.0 million Euros, in 2010.

The last segment is blue mussels on long lines (Mussel long line), which has been introduced in recent years. The production was 1,300 tonnes with a corresponding income of 1.7 million Euros, in 2010. The segment had 12 enterprises representing 17 farms. The farms are almost all located in Limfjorden in the northern part of Jutland. The blue mussel farms is a relative new and small segment both in terms of weight and value in the Danish aquaculture sector. The segment is struggling to increase production and productivity, but so far the conditions and competition in this sector have not been favourable to the Danish producers. The blue mussel farmers have been represented in The Danish Account Statistics for Aquaculture since 2006, but so far without a positive net profit.

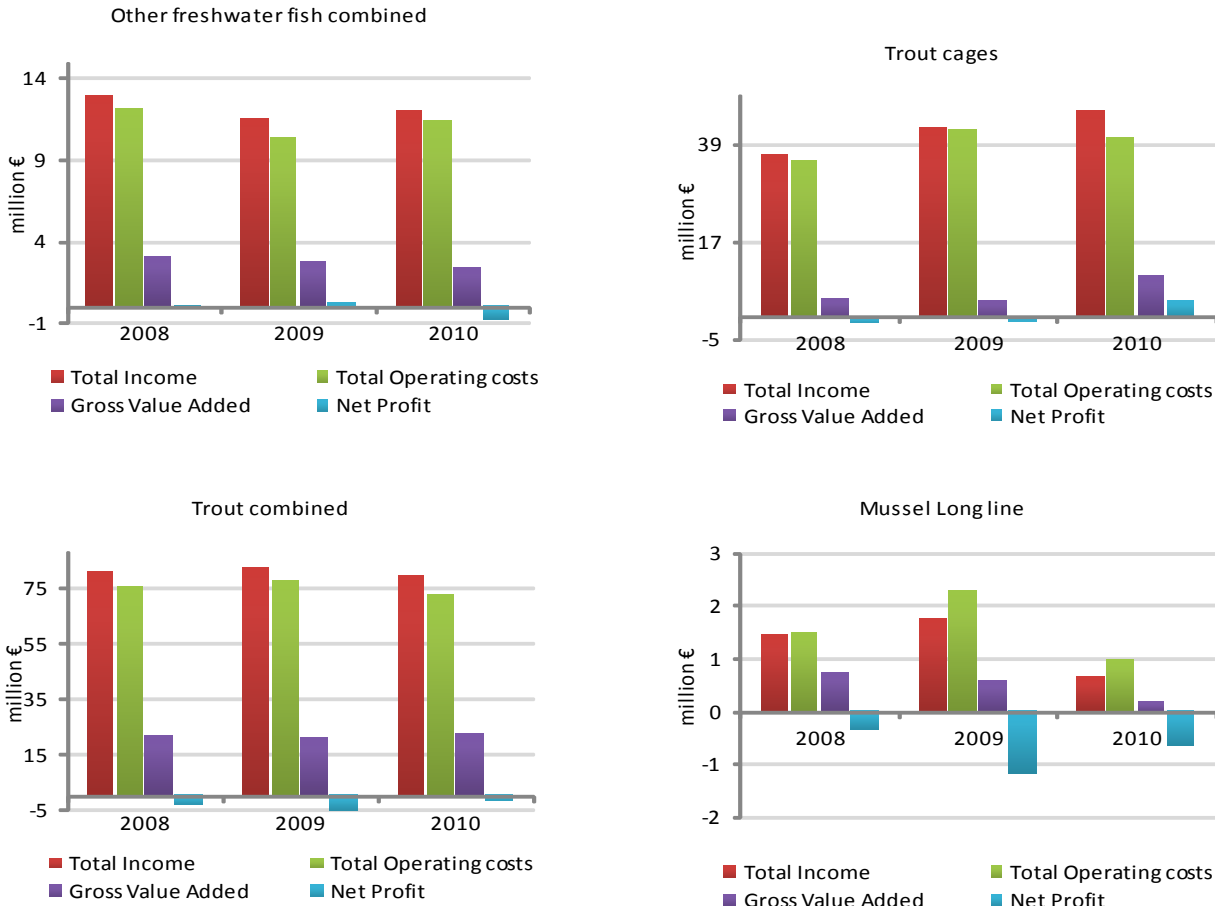
In Table 5.6.3, the economic indicators for the four Danish segments are presented. From the table it can be seen that the only segments that provide a positive EBIT are the trout cages and trout combined, whereas the only segment providing a positive net profit is the trout cages, in 2010.

Table 5.6.3 Economic performance for Denmark at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Mussel Long line							
Total Income (million €)	1.4	100%	1.8	100%	0.7	100%	-62%
Gross Value Added (million €)	0.7	52%	0.6	34%	0.2	27%	-69%
Operating Cash Flow (million €)	0.0	-2%	-0.5	-30%	-0.3	-46%	41%
Earning before Investments & tax (million €)	-0.3	-18%	-0.9	-51%	-0.4	-67%	50%
Net Profit (million €)	-0.3	-24%	-1.2	-67%	-0.7	-97%	44%
Volume of sales (thousand tonne)	1.5		2.5		1.3		-48%
Other freshwater fish combined							
Total Income (million €)	12.9	100%	11.5	100%	12.0	100%	4%
Gross Value Added (million €)	3.0	23%	2.8	24%	2.3	19%	-16%
Operating Cash Flow (million €)	0.9	7%	1.2	10%	0.6	5%	-48%
Earning before Investments & tax (million €)	0.4	3%	0.6	5%	-0.1	-1%	-118%
Net Profit (million €)	-0.1	0%	0.2	2%	-0.8	-7%	-493%
Volume of sales (thousand tonne)	1.6		1.4		1.6		18%
Trout cages							
Total Income (million €)	36.4	100%	42.7	100%	46.7	100%	9%
Gross Value Added (million €)	4.3	12%	3.8	9%	9.5	20%	153%
Operating Cash Flow (million €)	1.2	3%	0.5	1%	6.2	13%	1109%
Earning before Investments & tax (million €)	0.0	0%	-0.6	-1%	5.0	11%	-914%
Net Profit (million €)	-1.5	-4%	-1.0	-2%	3.7	8%	-462%
Volume of sales (thousand tonne)	8.9		10.3		10.0		-3%
Trout combined							
Total Income (million €)	81.0	100%	82.6	100%	79.9	100%	-3%
Gross Value Added (million €)	21.9	27%	20.7	25%	22.5	28%	9%
Operating Cash Flow (million €)	5.8	7%	4.9	6%	7.2	9%	47%
Earning before Investments & tax (million €)	1.4	2%	-0.7	-1%	2.2	3%	-433%
Net Profit (million €)	-3.5	-4%	-5.4	-7%	-2.0	-2%	-64%
Volume of sales (thousand tonne)	32.6		31.2		28.8		-8%

In figure 5.6.2, the economic performance of the four Danish segments is shown. From the figures it can be seen that the operational cost in most segment are very close to the total income. The gross value added is positive for all segments, but the net profit are negative in most years.

Figure 5.6.3 Economic performance indicators per segments for Denmark: 2010.

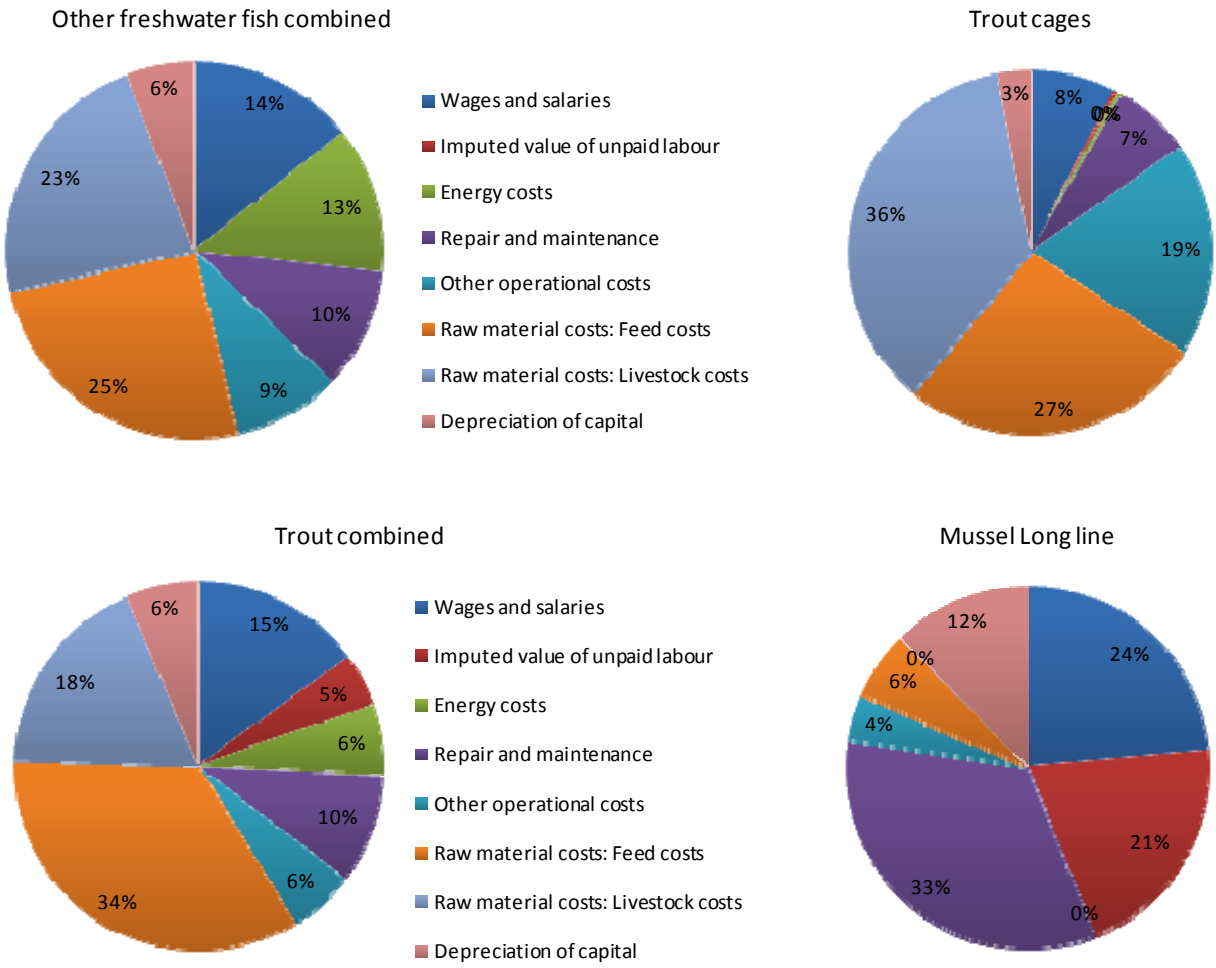


In Figure 5.6.4, the operational cost structures for the four Danish segments are presented. The Trout combined segment show the traditional cost composition for a land based finfish aquaculture industry, where the main cost components are feed and livestock, which covers 52 % of the total operational costs. In the segment Other freshwater fish combined, the main cost components are also feed and livestock, which covers 48 % of the total operational costs. The energy cost covers 13 % of the total cost, which is twice as much as the segment Trout combined. The reason for the higher energy cost is the use of highly recirculated systems in this segment.

In the Trout cages at sea, the cost components feed and livestock are also the most important covering 53 % of the total operational costs. In the sea cage farming the cost of livestock is more important than feed, which is the opposite of the composition in the land based farms. The fish (smolt) bought for the sea cage production is larger than for land based production, which explains the difference in the cost compositions. Also the other operational cost is higher due to the cost associated with the transports of feed, fish and equipment to the production site.

The segment Mussel long line has a totally different cost structure because the production due not include cost of feed and livestock. The most important cost item is repair and maintenance of the production system (lines and boats) and the labour costs for repair, maintenance and harvesting.

Figure 5.6.4 Cost structure of main segments for Denmark: 2010



5.6.3 Trends and triggers

Growth in aquaculture has been on the political agenda for a long time in Denmark, the EU and OECD, as a possible solution for increasing the fishing industry raw material basis and creating growth and jobs, both in the primary industry and the follow industries. However, over the last 20 years the growth in Denmark, the EU and most OECD countries has stagnated.

Growth in the aquaculture sector is desirable, because the demand for fish is increasing; the capture fisheries have stagnated and the dependency on imported fish is growing inside the EU. Inside the European Union (EU), attempts have been made to increase aquaculture production in a sustainable way (European Commission 2002,

2009)[1], but so far without success. The failed attempts to achieve sustainable growth under the existing regulatory regime based on command and control have increased the need to analyse alternative regulation and management policies of the aquaculture sector if the aim of sustainable growth is to be reached.

Currently, the Danish aquaculture sector is regulated by farm specific feed quotas. Feed is the most important input and accounts for more than 40 % of the costs. In a specialized aquaculture production, there are only limited or zero substitution possibilities for feed. The use of feed is, therefore, closely linked to the possible production, and thereby to the pollution discharged from the farm. The existing regulation secures that the overall level of nitrogen pollution is not exceeded. However, a new technology introduced in Denmark can reduce nitrogen pollution by 30-50 % per kilo of produced fish. Reducing the level of nitrogen is expected to also reduce the levels of other externalities, such as phosphorus and organic material. This technical solution may offer the possibility of realizing growth without increasing existing levels of pollution. Results in Nielsen (2011, 2012)[2] suggest that the shift to new environmentally friendly technology has no significant impact on farm efficiency. However, the new technology will only be implemented if farmers have an incentive to do so, which is not present under the existing regulation.

A new regulation based on individual transferable quotas on nitrogen has been recommended by the Danish Government Aquaculture Committee in 2010, with the aim of increasing production without increasing the existing level of pollution. The ambition is to increase Danish fresh water aquaculture production from about 30,000 to 60,000 tonnes and aquaculture production in general from 45,000 to 115,000 tonnes from 2007 to 2013.

Under the existing regulation, the farmer's main focus is to optimize production based on the feed quota, whilst he has no incentive to reduce the pollution discharged from the farm, because there is no feedback between this, and production and profit. A regulatory change to individual pollution rights on nitrogen can ensure that the most efficient farmers will be the ones who produce. This can potentially increase production and profit, without increasing pollution. Furthermore, it would provide the farmers with an incentive to reduce pollution in order to increase production and profitability, which would lead to further development and the adoption of new environmentally friendly production methods and technologies. It is important to identify the possible gains and losses of regulatory changes, because if a regulation is not optimal, it can lead to welfare losses for the society and individual producers.

[1] European Commission, 2002. Communication from the Commission on a Strategy for the Sustainable Development of European Aquaculture – EUR. COM(2002) 511. European Commission, 2009. Communication from the Commission to the European Parliament and Council. Building a sustainable future for aquaculture. A new impetus for the Strategy for the Sustainable Development of European Aquaculture. COM(2009) 162 final.

[2] Nielsen, R., 2011. Green and Technical Efficient Growth in Danish Fresh Water Aquaculture. Aquaculture Economics & Management, 15(4): 262-277. Nielsen, R., 2012. Introducing Individual Transferable Quotas on Nitrogen in Danish Fresh Water Aquaculture: Production and Profitability Gains. Ecological Economics, 75: 83-90.

Issues of special interest

In Denmark, a few farms are experimenting on the production of new species and using new technology. So far, the most successful project is the production of Pike Perch in recirculating systems. Furthermore a minor production of turbot fingerlings exists, where the fingerlings are used for restocking and some are exported to Holland and Spain. A new large land based recirculation system has been set up for the production of Atlantic salmon. In a land based facility the control of the production process is higher than in a sea cage farm and there is a better opportunity to control the pollution of nitrogen, phosphorus and organic material etc., on the other hand, the operational cost is expected to be higher than in the sea cage farms.

Outlook for 2011 and 2012

For the Danish trout producers 2012 are expected to be better than 2010. The reason is that the Danish regulation for aquaculture production has been changed in 2011. The change in regulation should provide the producers with an incentive to introduce more environmental friendly technology in order to raise production. However, it is questionable if the production increase will influence on the production in 2011.

The eel farmers are expected to decrease production due to the restriction on the harvesting of glass eels. Furthermore, this restriction drives up prices on glass eels making it less profitable to produce eel. The mussel farmers are expected to increase production and turnover, but it is still questionable if the profit will be positive.

5.6.4 Data coverage and Data Quality

Data quality

The account statistic for 2010 is based on a sample of 137 aquaculture farms, which covers 53 % of the total population of 257 farms. The sample covers 77 % of the total income of the population. Furthermore, data on sales weight and value, purchase of livestock raw material of fish are available for all farms.

The Danish Directorate of Fisheries has registered the total population of farms and enterprises engaged in aquaculture production in Denmark. It is mandatory for all aquaculture producers in Denmark to report the production in weight and value each year at the farm level. Furthermore, the species produced and the technique used in the production is reported.

The data for The Danish Account Statistics for Aquaculture is collected by Statistics Denmark. The collection is based on the total population of farms provided by The Danish Directorate of Fisheries. The data is collected on farm level, and can be aggregated to the enterprise level. The data is collected on farm level to get the most homogeneous segments in terms of species and technique. The Danish Account Statistics for Aquaculture collects economic data for costs and earnings and balance sheets. Data is collected on a voluntary basis from the owner's chartered accountant. The accountant's task is to report the accounts of his aquaculture clients to Statistics Denmark in a special form where the account information is harmonized for statistical use. Statistics Denmark validates the data from each account in a specially designed data system for quality control. The

Danish Commerce and Companies Agency (DCCA) also collect account data for enterprises, but not for single holders. For enterprises which are not reported by the chartered accountant, the accounts from DCCA are used.

The extrapolation of the sample to the total population is done in two steps. In the first step all results from the collected accounts are entered into a database containing information on all existing aquaculture producers in Denmark. From the collected accounts an average is calculated for all indicators in each segment. In the second step, an account for the remaining population are estimated based on the average calculated in the first step and the information collected by the Danish Directorate of Fisheries. The underlying assumptions for this calculation are that the production function for each farm is identical within each segment. When the production function is identical, the costs and earnings can be distributed from the sales volume and value in each account.

Data availability

Data for the aquaculture sector is published once a year on both an aggregated farm and enterprise level for each segment. The aquaculture statistics are published on Statistics Denmark's website approximately 12 months after the end of the reference year.

Confidentiality

The 4 segments that are surveyed in Denmark are presented in Table 5.6.3. To avoid problems with confidentiality, segments should in general include more than 10 enterprises. In Denmark, both the production of the sea cages farms and the production of eel in recirculation systems are quite significant in terms of value, and even though these two segments include less than 10 companies, they are surveyed. In order to present detailed data collected from these two segments, nearly all enterprises have agreed to participate in the survey.

Input of expert about the segmentation on enterprise level, the homogeneity of the segments in terms of techniques and species.

All segments provided by Statistics Denmark have a high degree of homogeneity both concerning the species and technique. The separation of species into segments is 100%, but if an enterprise produces more than one species, then it is allocated to the segment of the species that contributes the most to the turnover.

Some enterprises own more than one farm using different techniques. In Denmark these activities are split up, because the farm is used as data collection unit. When farms are aggregated into enterprises again, the enterprise is allocated to the segment, where its turnover is highest. There are only very few examples of enterprises using more than one technique.

Differences with other official data sources (Eurostat)

There are some differences in the weight and value collected by the Danish Directorate of Fisheries and Statistics Denmark. In general, both weight and value are higher in the Aquaculture Account Statistics. The

reason for this is that the value and weight in the Account Statistics are measured in enterprise sales, while the numbers from the Danish Directorate of Fisheries are measured as farm production. Secondly the data collected by Statistics Denmark are account data and the account year is not necessarily coinciding with the calendar year.

5.7 ESTONIA

5.7.1 Overview of the sector

Estonian aquaculture sector is very small. There are around 20 commercial companies in Estonia whose main important activity is fish farming. The main product is rainbow trout forming around 80 % from the total production. The share of the second important fish – common carp, is already only around 7 %. There is only one fish farm growing eel in Estonia, which total sales volume was about 20 tonnes in 2010. Salmon is rearing for restocking only by one fish farm, which is state-owned and has no commercial purpose. Additionally, few enterprises provide very limited production of other freshwater species mainly for restocking (sea trout, pike, pikeperch, whitefish, tench).

Therefore, it is reasonable to collect data only concerning rainbow trout, due to the small number of other enterprises that would lead to confidentiality issues. Moreover, concerning other species the value of production is too small to justify any sampling activities, but also confidentiality problems arise. Even concerning rainbow trout the total number of enterprises is only 11. The total sales volume of these 11 enterprises was 488 tonnes fish having turnover around 1.4 million Euros in 2010. The number of total employees was 30.

Table 5.7.1 Sector overview for Estonia: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*11*	*11*	*11*	*0%*
<= 5 employess	10	10	11	10%
6-10 employess	1	1	0	-100%
> 10 employees	0	0	0	
Employment (number)				
Total employees	*38*	*33*	*30*	*-9%*
Male employees	27	23	20	-13%
Female employees	11	10	10	0%
FTE	*24*	*20*	*21*	*5%*
Male FTE	16	14	14	0%
Female FTE	8	6	7	17%
Input & Production (thousand tonnes)				
Raw material volume: Feed	0.4	0.4	0.4	18%
Raw material volume: Livestock	0.1	0.1	0.1	-7%
Production volume	0.3	0.4	0.5	16%
Indicators				
FTE per enterprices	2.2	1.8	1.9	5%
Average wage (thousand €)	13.7	14.0	13.2	-5%
Labour productivity (thousand €)	19.1	21.1	32.7	55%

The sector overview for Estonia and trends in 2008-2010 are presented in the Table 5.7.1. There were no changes in the number of enterprises between 2008 and 2010. Compared to last year the total sales volume increased 16 % in 2010. The number of FTE (full time employment) in the rainbow trout farming sector in 2009 was 20. In 2010, the same number was 21, increasing by 5 %. At the same time the average salary per employee (FTE) decreased 5 % and reached to 13,229 Euros in 2010, see the Figure 5.7.1. The labour productivity increased by 55 %. The main reason for that was the increase in the total sales volume.

Figure 5.7.1 Estonia employment trends: 2008-2010.

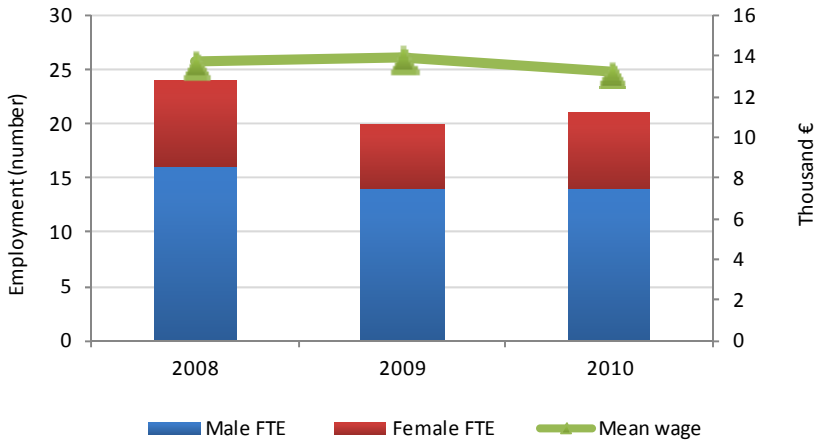
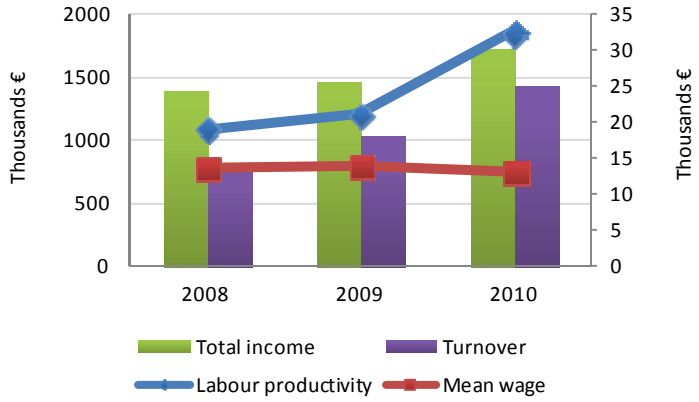


Figure 5.7.2 Estonian income, wages and labour productivity trends: 2008-2010.



Economic performance and performance indicators in 2008-2010 are presented in Table 5.7.2. Compared to last year the turnover of rainbow trout sales increased approximately 37 % in 2010. The amount of gross added value (GVA) generated by the rainbow trout farming enterprises in 2010 was 0.7 million Euros, a 63 % higher than in the previous year. The earnings before interest and tax (EBIT) and the operating cash flow (OCF) increased 110 % and 71 %, respectively. The sector was supported by investment subsidies of around 44 thousand Euros in 2010, which was 64 % lower than in 2009. The total operating costs reached to 1.3 million Euros.

Table 5.7.2 Economic performance for Estonia: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	0.8	59%	1.0	71%	1.4	83%	37%
Other income	0.5	37%	0.3	20%	0.3	15%	-12%
Subsidies	0.1	4%	0.1	8%	0.0	3%	-64%
Total income	*1.4*	*100%*	*1.5*	*100%*	*1.7*	*100%*	*19%*
Expenditure (million €)							
Wages and salaries	0.3	23%	0.3	19%	0.2	10%	-39%
Imputed value of unpaid labour	0.0	0%	0.0	0%	0.1	6%	
Energy costs	0.1	6%	0.1	9%	0.2	9%	22%
Repair and maintenance	0.0	3%	0.1	5%	0.1	4%	-16%
Raw material costs: Feed costs	0.5	38%	0.4	30%	0.6	33%	29%
Raw material costs: Livestock costs	0.1	7%	0.1	7%	0.1	7%	24%
Other operational costs	0.1	9%	0.2	12%	0.1	6%	-42%
Total operating costs	*1.2*	*87%*	*1.2*	*82%*	*1.3*	*74%*	*7%*
Capital Costs (million €)							
Depreciation of capital	0.1	8%	0.1	8%	0.1	8%	21%
Financial costs, net	0.1	4%	0.1	5%	0.1	5%	18%
Extraordinary costs, net	0.0	0%	0.0	0%	0.0	0%	
Capital value (million €)							
Total value of assets	3.9	279%	4.0	276%	4.7	272%	17%
Net Investments	0.1	7%	0.4	27%	0.3	19%	-16%
Debt	1.4	97%	1.7	118%	1.7	95%	-4%
Performance Indicators (million €)							
Gross Value Added	0.5	33%	0.4	29%	0.7	39%	63%
Operating Cash Flow	0.2	13%	0.3	18%	0.5	26%	71%
Earning before Interest and Tax	0.1	5%	0.1	10%	0.3	18%	110%
Net Profit	0.0	1%	0.1	6%	0.2	13%	184%
Capital Productivity	11.7		10.4		14.5		
Return on Investments (%)	1.9		3.7		6.6		
Financial position (%)	65.1		57.3		65.0		
Future Expectation Indicator (%)	-0.5		6.9		4.1		

5.7.2 Structure and economic performance of the sector's main segments

Enterprises farming rainbow trout in Estonia can be divided into two segments based on fish farming techniques:

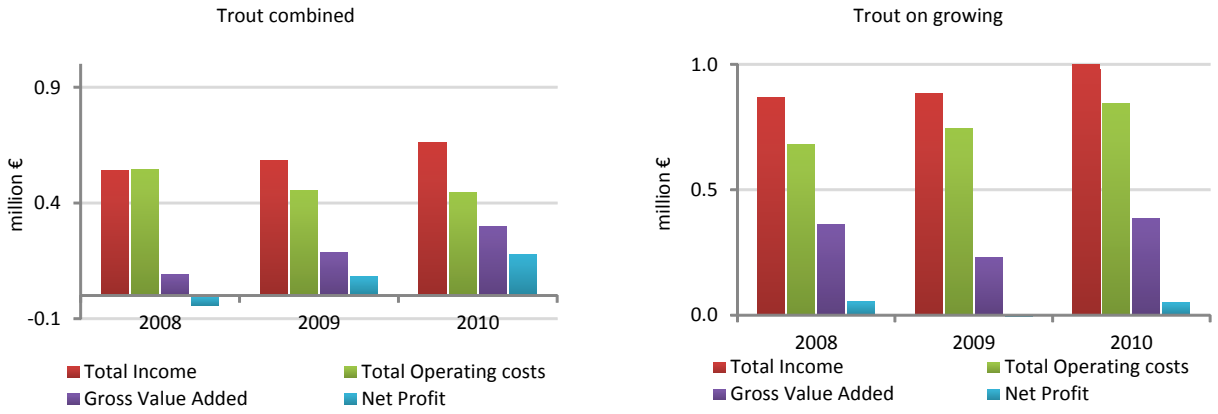
- Trout on growing;
- Trout combined (including trout on growing and trout hatcheries & nurseries).

Economic performance and performance indicators for main segments in 2010 are presented in Table 5.7.3. and Figure 5.7.3. The total income for trout on growing and trout combined were 1.1 and 0.7 million Euros in 2010, respectively. Compared to last year the total income increased for trout on growing 22 % and for trout combined 14 %. However, the production volume for trout combined was somewhat lower than in 2009. Economic performance indicators showed rather increasing trend for both segments in 2010.

Table 5.7.3 Economic performance for Estonia at segment level:2008-2010.

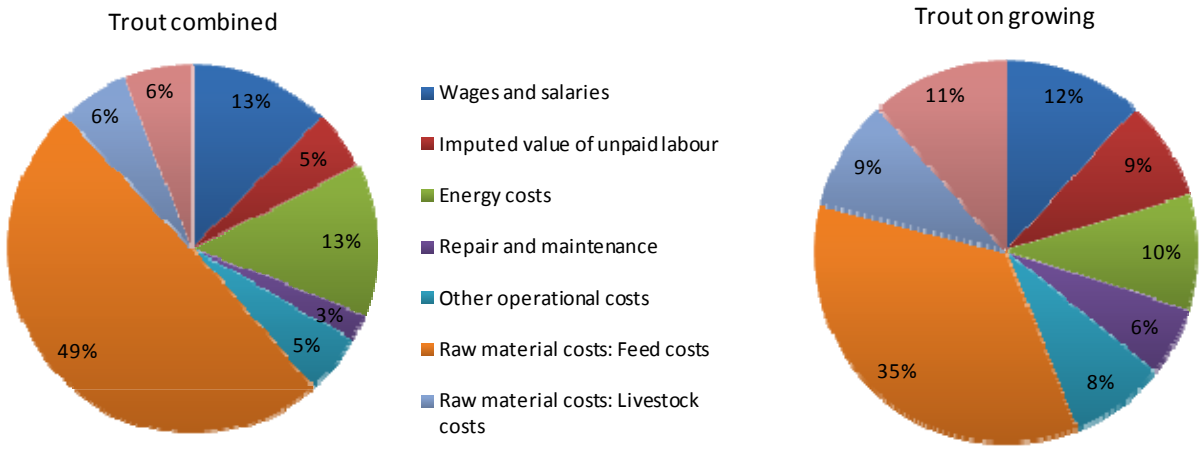
	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Trout combined							
Total Income (million €)	0.5	100%	0.6	100%	0.7	100%	14%
Gross Value Added (million €)	0.1	17%	0.2	32%	0.3	45%	60%
Operating Cash Flow (million €)	0.0	-1%	0.1	22%	0.2	33%	70%
Earning before Investments & tax (million €)	0.0	-7%	0.1	17%	0.2	28%	95%
Net Profit (million €)	0.0	-8%	0.1	15%	0.2	27%	106%
Volume of sales (thousand tonnes)	0.2		0.3		0.2		-43%
Trout on growing							
Total Income (million €)	0.9	100%	0.9	100%	1.1	100%	22%
Gross Value Added (million €)	0.4	42%	0.2	26%	0.4	36%	65%
Operating Cash Flow (million €)	0.2	22%	0.1	16%	0.2	22%	72%
Earning before Investments & tax (million €)	0.1	13%	0.1	6%	0.1	12%	138%
Net Profit (million €)	0.1	7%	0.0	-1%	0.1	5%	-1140%
Volume of sales (thousand tonnes)	0.1		0.2		0.3		117%

Figure 5.7.3 Economic performance indicators per segments for Estonia: 2010.



The total amount of costs by the trout on growing and trout combined segments in 2010 were 0.96 and 0.47 million Euros, respectively. The two largest cost items were formed by feed costs and labour costs, see the Figure 5.7.4.

Figure 5.7.4 Cost structure of main segments for Estonia: 2010



5.7.3 Trends and triggers

Due to its small size, the aquaculture sector has little influence on the national economy in Estonia. Wholesale and processing companies are not interested in the domestic production due to small production and unstable supply of aquaculture products. Aquaculture has a little more influence on the economy through tourism, because they supply put-and-take ponds which are an attractive part of leisure time activities in many holiday houses.

Despite the difficulties fish farmers have started to modernise fishing farms to increase production. Also they have realised that the adding value through processing and increasing the quality of products (filleting, salting, marinating, smoked) can help to broaden the market and raise profitability. Some enterprises have expressed an interest in the cultivation of new fish species which may expand marketing possibilities. Based on preliminary data an increase in total production weight is expected in aquaculture sector in 2011 and 2012.

5.7.4 Data coverage and Data Quality

Due to the small number of commercial fish farming companies it was reasonable to collect data only concerning rainbow trout. For other species, the value of production was too small to justify any sampling activities, as well as problems with confidentiality issues. This can be a reason why DCF and EUROSTAT data may be different. DCF data were collected through questionnaires by the Estonian Marine Institute and then compared with the data in the financial statements.

5.8 FINLAND

5.8.1 Overview of the sector

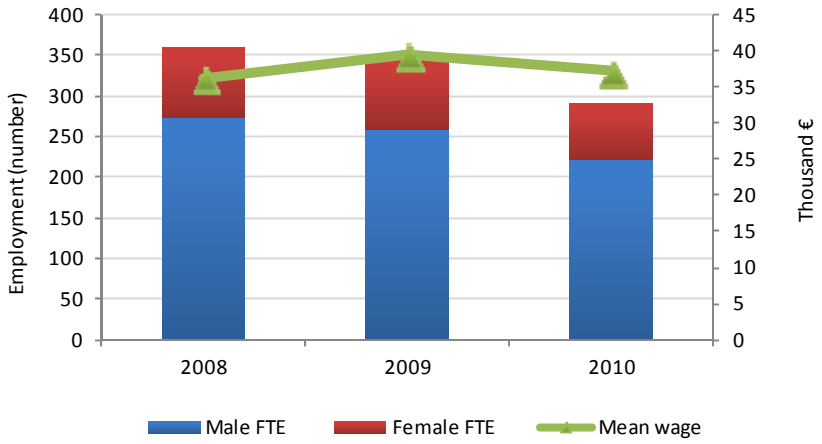
There were 234 operative aquaculture companies in 2010 in Finland. The companies were mainly small and they had fewer than five employees. The share of medium sized companies measured according to their employment have increased. The total number of employees was 359. About 80 % of the employees were men. When employment was measured according to FTE, the number of employees was 290. FTE per enterprise did not change a lot, but the aquaculture sector needed less labour than before.

The total sales volume of aquaculture sector was 12.9 thousand tonnes, which meant a drop of about 9 % compared to the volume of the previous year. The inputs of livestock and feed decreased also together with the decreased production volume. The feed volume amounted to 14.6 thousand tonnes and livestock to 0.6 thousand tonnes.

Table 5.8.1 Sector overview for Finland: 2008-2010.

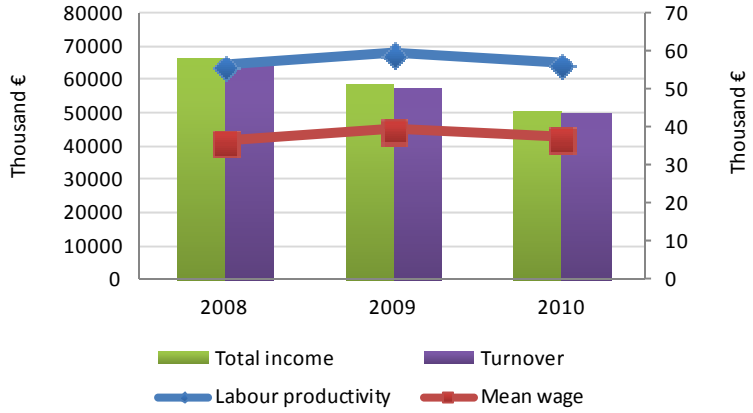
	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*262*	*259*	*234*	*-10%*
<= 5 employess	252	249	222	-11%
6-10 employess	4	4	7	75%
> 10 employees	6	6	5	-17%
Employment (number)				
Total employees	*442*	*418*	*359*	*-14%*
Male employees	336	315	276	-12%
Female employees	106	103	83	-19%
FTE	*361*	*347*	*290*	*-16%*
Male FTE	274	260	223	-14%
Female FTE	87	87	67	-23%
Input & Production (thousand tonnes)				
Raw material volume: Feed	18.7	15.9	14.6	-8%
Raw material volume: Livestock	0.9	0.7	0.6	-6%
Production volume	16.5	14.1	12.9	-9%
Indicators				
FTE per enterprise	1.4	1.3	1.2	-7%
Average wage (thousand €)	36.3	39.5	37.3	-6%
Labour productivity (thousand €)	56.2	59.5	56.8	-5%

Figure 5.8.1 Finland employment trends: 2008-2010.



The average wage in the sector was 37.3 thousand Euros. The salary level and labour productivity went slightly downwards compared to the earnings of the previous year, but they stayed still higher than in year 2008. Labour productivity was 56.8 thousand Euros in 2010.

Figure 5.8.2 Finish income, wages and labour productivity trends: 2008-2010.



The turnover of aquaculture sector decreased to 50.3 million Euros. The drop was 12 % compared to the turnover of the previous year. The other income went down by 45 %, but its influence on the total income was not significant. The most important costs in the aquaculture sector were feed and personnel costs. The share of feed costs was about 40 % and personnel costs about 20 % compared to the volume of the total income. Operating costs totalled up to about 90 % of total income. Financial and extraordinary costs were no burdens in the Finnish aquaculture sector in 2010.

Total value of assets decreased to 74.8 million Euros compared to 81.3 million Euros in the previous year, which meant a drop of 8 %. Net investments were also downwards pointing at continuing of the decline. Companies also diminished their debts, which relieved their budgets. Due to these disinvestments, the future expectations from the industry indicator are slightly negative. Performance indicators indicated that companies had actually managed to attain a better financial situation by controlling their investments. Capital productivity and return

on investment were not so advantageous than before. Although the gross value added and the operating cash flow declined by about 20 %, companies achieved a higher net profit.

Table 5.8.2 Economic performance for Finland: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	65.8	98%	57.4	98%	50.3	98%	-12%
Other income	0.9	1%	0.9	2%	0.5	1%	-45%
Subsidies	0.6	1%	0.3	0%	0.3	1%	11%
Total income	*67.3*	*100%*	*58.6*	*100%*	*51.1*	*100%*	*-13%*
Expenditure (million €)							
Wages and salaries	11.4	17%	12.5	21%	9.7	19%	-22%
Imputed value of unpaid labour	1.7	3%	1.2	2%	1.1	2%	-13%
Energy costs	1.8	3%	1.4	2%	1.3	3%	-9%
Repair and maintenance	2.2	3%	1.8	3%	1.7	3%	-9%
Raw material costs: Feed costs	25.8	38%	20.9	36%	19.0	37%	-9%
Raw material costs: Livestock costs	6.6	10%	5.3	9%	4.8	9%	-9%
Other operational costs	10.1	15%	8.2	14%	7.5	15%	-9%
Total operating costs	*59.5*	*88%*	*51.3*	*88%*	*45.1*	*88%*	*-12%*
Capital Costs (million €)							
Depreciation of capital	2.8	4%	2.7	5%	2.0	4%	-25%
Financial costs, net	-0.4	-1%	1.4	2%	-0.5	-1%	-139%
Extraordinary costs, net	-0.5	-1%	-2.4	-4%	-2.4	-5%	
Capital value (million €)							
Total value of assets	84.4	125%	81.3	139%	74.8	146%	-8%
Net Investments	1.5	2%	2.5	4%	1.6	3%	-36%
Debt	46.1	68%	45.4	77%	36.5	71%	-19%
Performance Indicators (million €)							
Gross Value Added	20.3	30%	20.7	35%	16.5	32%	-20%
Operating Cash Flow	7.8	12%	7.2	12%	6.0	12%	-17%
Earning before Interest and Tax	5.0	7%	4.5	8%	4.0	8%	-12%
Net Profit	5.4	8%	3.2	5%	4.5	9%	43%
Capital Productivity (%)	24.0		25.4		22.0		
Return on Investments (%)	5.9		5.6		5.3		
Financial position (%)	45.4		44.2		51.1		
Future Expectation Indicator (%)	-1.5		-0.2		-0.5		

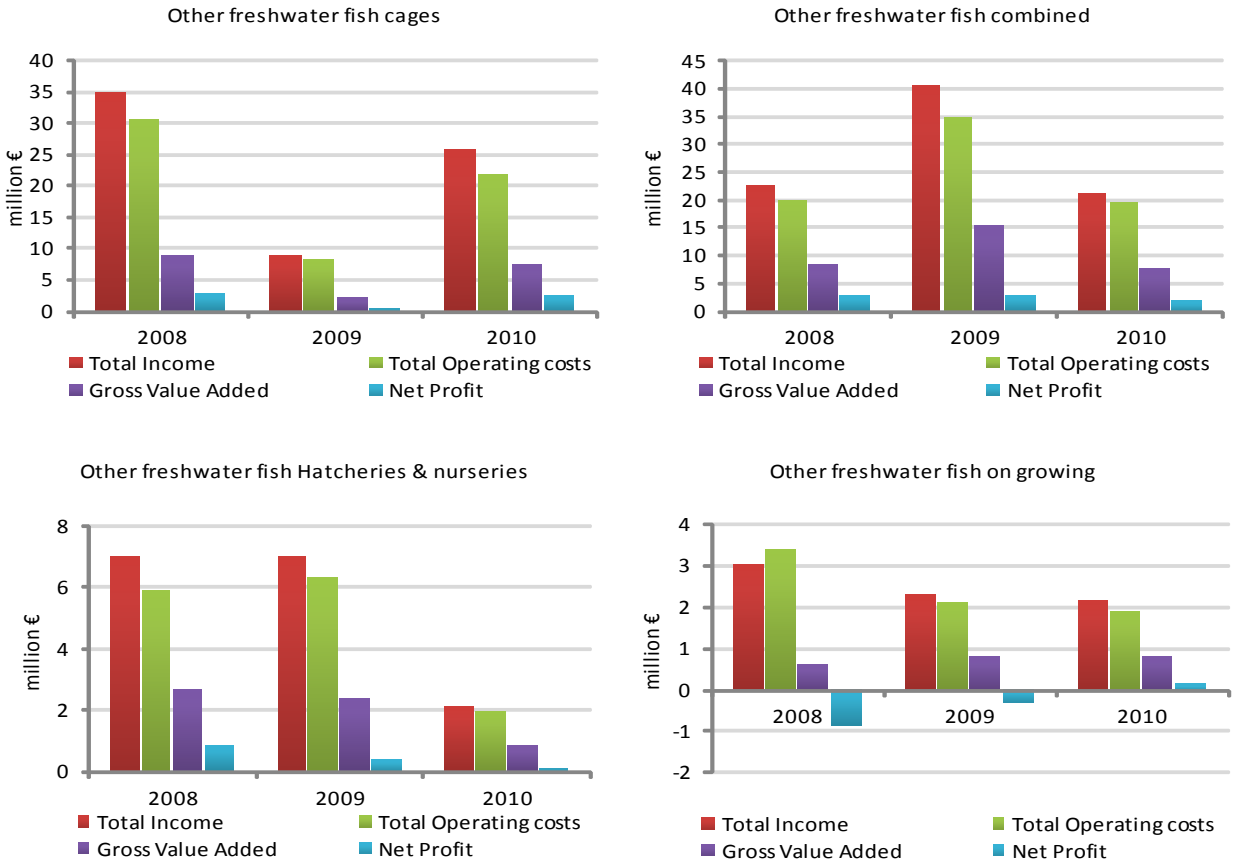
5.8.2 Structure and economic performance of the sector's main segments

The Finnish aquaculture has four main segments. There are marine cages in Baltic Sea, the combined production of juveniles and food fish including natural food ponds, hatcheries and nurseries and the food fish production inland (on growing segment) in raceways or cages in lakes. The two main fish species produced are rainbow trout and European whitefish. In addition to food fish, aquaculture produces fry both for stocking and further rearing.

Table 5.8.3 Economic performance for Finland at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 - 2010
Other freshwater fish cages							
Total Income (million €)	34.7	100%	8.9	100%	25.8	100%	189%
Gross Value Added (million €)	8.8	25%	2.1	23%	7.4	29%	258%
Operating Cash Flow (million €)	4.3	12%	0.9	10%	3.9	15%	354%
Earning before Investments & tax (million €)	3.2	9%	0.4	4%	2.7	11%	670%
Net Profit (million €)	2.7	8%	0.2	2%	2.5	10%	1379%
Volume of sales (thousand tonnes)	11.0		2.6		8.4		218%
Other freshwater fish combined							
Total Income (million €)	22.6	100%	40.4	100%	21.1	100%	-48%
Gross Value Added (million €)	8.2	36%	15.5	38%	7.5	36%	-51%
Operating Cash Flow (million €)	2.7	12%	5.5	14%	1.7	8%	-70%
Earning before Investments & tax (million €)	1.7	7%	3.9	10%	1.0	5%	-75%
Net Profit (million €)	2.7	12%	2.9	7%	1.8	9%	-38%
Volume of sales (thousand tonnes)	4.2		10.2		3.8		-63%
Other freshwater fish Hatcheries & nurseries							
Total Income (million €)	7.0	100%	7.0	100%	2.1	100%	-70%
Gross Value Added (million €)	2.7	38%	2.4	34%	0.8	38%	-66%
Operating Cash Flow (million €)	1.1	16%	0.7	10%	0.1	7%	-79%
Earning before Investments & tax (million €)	0.8	12%	0.4	6%	0.1	4%	-80%
Net Profit (million €)	0.8	12%	0.4	6%	0.1	3%	-86%
Volume of sales (thousand tonnes)	0.6		0.7		0.2		-74%
Other freshwater fish on growing							
Total Income (million €)	3.0	100%	2.3	100%	2.2	100%	-5%
Gross Value Added (million €)	0.6	20%	0.8	34%	0.8	37%	2%
Operating Cash Flow (million €)	-0.4	-12%	0.2	8%	0.3	14%	70%
Earning before Investments & tax (million €)	-0.6	-21%	-0.1	-5%	0.2	8%	-274%
Net Profit (million €)	-0.9	-29%	-0.3	-14%	0.1	7%	-147%
Volume of sales (thousand tonnes)	0.7		0.6		0.5		-8%

Figure 5.8.3 Economic performance indicators per segments for Finland: 2010.



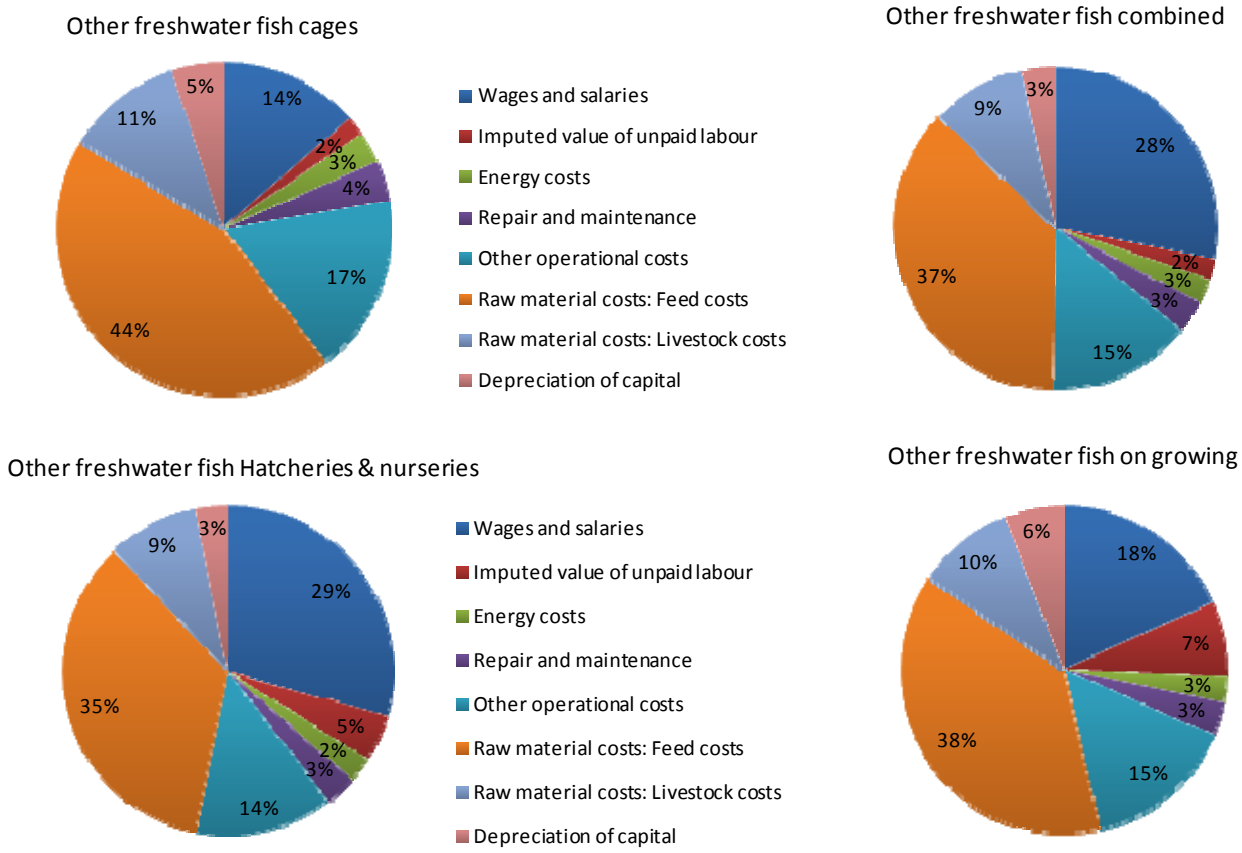
The production of rainbow trout fry on fish farms is supplied almost exclusively for food fish farming. Some volumes of Baltic salmon, landlocked salmon, sea trout, char and brown trout are also produced, but their fry production is mostly delivered for stocking. Juveniles are mainly grown in tanks and natural food ponds by specialized companies or integrated to food fish production. The fry reared on fish farms is mainly supplied for further rearing as food fish, whereas those reared in natural food ponds goes mainly for stocking. Only commercial aquaculture production is considered in this report. Incomes and production volumes have varied yearly per segments due to production changes, but also because of company movements between segments and possible variation in coding. This is the case especially between the segments of cages and combined methods.

Segment 5.4: Freshwater fish marine cages

There were 38 companies that had fish cages on saltwater in Finland in 2010. They produced about 8.4 thousand tonnes mainly rainbow trout and European whitefish for food. This is the biggest segment in the Finnish aquaculture. The income amounted up to about 26 million Euros, about the 50 % of the total Finnish aquaculture income. The economic situation in this segment had developed favourably. It was also proportionally the best performer in operating cash flow (15 %) and net profit (10 %). Net profit increased significantly. Marine cages obtained an EBIT of 11 %. The share of feed costs was the highest in this segment,

being above 40 % of the total costs. On the other hand personnel costs were at the lowest when compared to other segments.

Figure 5.8.4 Cost structure of main segments for Finland: 2010



Segment 5.3: Combined production of freshwater fish juveniles and food fish (including natural food ponds)

154 companies operated in the combined fish production segment and their total output was about 3.8 tonnes. The amounted income was quite close to the income of marine aquaculture by its value of 21.1 million Euros and the share of about 40 % of the total aquaculture income, but unfortunately its economic performance indicators had turned downwards. EBIT was 5 % and net profit 9 %.

Segment 5.1: Hatcheries and nurseries

Hatcheries and nurseries were moderate players in the Finnish aquaculture. There were 23 companies and they had specific roles in juvenile and fry production consisting of 0.2 tonnes. This segment had the lowest profitability. EBIT was 4 % and net profit 3 %. The personnel costs were significantly high.

Segment 5.2: Freshwater food fish production inland (on growing)

There were 19 active companies in food fish production inland. The output in this segment was 0.5 tonnes. This segment was the second best in the profitability by its EBIT of 8 % and net profit of 7 %, but these indicators were downwards compared to the previous year. Personnel costs were proportionally the second lowest indicating typically the high labour productivity of the food fish production compared to the fry production.

5.8.3 Trends and triggers

The decrease of the total sales volume in 2010 was about 1.3 thousand tonnes, which meant a drop of about 9%. In the recent years the Finnish aquaculture has downsized its production due to the economic recession and the fierce competition caused by imported fish. Imports originate mainly from Norway. By controlling its investments the sector managed in 2010 to gain better liquidity and net profit compared to the previous year. The expectations for the economic performance in 2011 were positive. In the economic survey made in the beginning of 2012, the companies looked forward positively, but a bit cautiously. Aquaculture aims to cope with new market demands and competition.

The environmental regulation of the sector and the permission system has led to a situation where it is restricted to gain economies of scale. The consolidation in the sector has happened by takeovers to receive more production licenses. Aquaculture is even more integrated to fish industry and wholesalers. Ecological effects on ecosystems have been alleviated by developing production systems, feed and their efficiency.

The Ministry of Agriculture and Forestry together with the Ministry of the Environment has compiled a National Aquaculture Development Program 2015. According to the goal the industrial and environmental policies and tasks have to be realized in a coherent way taking care of both economic and environmental sustainability. The environmental facts are taken into consideration for example in the locations of bigger units in suitably waters.

5.8.4 Data coverage and Data Quality

Economic data collection of aquaculture sector in Finland combines information from different data sources. Main sources are a production survey, Structural Business Statistics of Statistic Finland (SF) and an account survey conducted by FGFRI. Financial statements were available for all companies in Business Register having aquaculture as main activity. The register gives full coverage in number of firms.

Primary sources of financial statements data in Statistics Finland are direct inquiries and business taxation material supplemented by the Business Register data. Data is based on corporate balance sheet and profit and loss account data. Statistics Finland checks for the validity of the data. Any missing data was estimated with stratum. Account data was surveyed by FGFRI by stratified survey to detect the detailed cost structure of fish farms. Cost and earnings were done by design-based and model-assisted regression and ratio estimation. The cost variables were estimated with ratio estimation from financial statements. Production survey was collected exhaustively from the producers. Any missing information was estimated by stratum. Annual income and production variations per segments are influenced by production changes, but also because of company

movements between segments and coding variation accordingly. This is the case especially between the segments of cages and combined methods.

There is a difference between EUROSTAT data and DCF data as the aquaculture production data of Finland in EUROSTAT includes only fish production and no juvenile or fry production. In addition the production volume in EUROSTAT includes all aquaculture food fish production in Finland and not only the companies having aquaculture as their main activity. On the other hand, the aquaculture production data in this report includes both food fish production and the juvenile and fry production. And it includes only companies having aquaculture as their main activity.

5.9 FRANCE

5.9.1 Overview of the sector

The total output of the French aquaculture sector in 2010 is 313.3 thousand tonnes and 882.5 million Euros. The total number of aquaculture farms is 3,298. Between 2009 and 2010, the evolution of the number of aquaculture farms shows an increase but over the past years, the trend of this number is drop. This result is due to 4 new segments which are added in 2010 in the global statistic : "other marine fish on growing" (segment 6.2) is a mix of few but very different fish farms; "other shellfish rafts" (segment 10.1), "other shellfish long line"(segment 10.2), and "other shellfish bottom" (segment 10.3), merge firms which produce jointly oyster and mussel. Firms in these segments are very heterogeneous and we do not have enough perspective to interpret economic indicators. Therefore no analysis will be made on these segments. Due to the new segments, the following analyses will not consider the evolutions between 2009 and 2010.

The French aquaculture sector is largely dominated by bivalve molluscs farming. In weight, shellfish farming ranks first with a production of 270 thousand tonnes and 703.1 million Euros of turnover.

Pacific cupped oysters (*Crassostrea gigas*) nearly represents 50 % of the whole aquaculture production in weight and value. Oysters are mainly produced in intertidal areas by elevated cultivation systems (bags on trestles – segment 8.3). The turnover of the oyster bottom segment (segment 8.3) represents a value of 401.4 million Euros and 123.8 thousand tonnes. In the Mediterranean, where oyster farming mostly takes place in lagoons, other techniques are used, mainly the culture on rope hung under tables (segment 8.1). The production reaches 13.5 million Euros and 5.7 thousand tonnes.

Two species of mussels are cultivated in France. Blue mussel (*Mytilus edulis*) and Mediterranean mussel (Galloprovincialis mussel) represent 30 % in weight, 20 % in value of the whole aquaculture production. Mussel farming in the Channel and Atlantic coasts is almost all based on the blue mussel. The predominant cultivation system relies on fixed wooden poles (so-called "*bouchot*" technique) used in inter-tidal areas (segment 7.3). This cultivation represents 83 % of the value of French mussel turnover (120.9 thousand Euros) and 79 % of the weight (66.8 thousand tonnes). In the Mediterranean, mussels are cultivated in raft (segment 7.1). The long line technique (segment 7.2) is being developed on open sea areas (Atlantic and Mediterranean). For some producers on the Atlantic coast, this technique is complementary to the "*bouchot*" technique. The long lines are used for catching spatfall and for a part of growing mussels. After 2 or 3 month, mussels are fixed on the "*bouchot*" in order to finish their growth. In this case, these companies are included in the mussel bottom segment (segment 7.3).

In freshwater fish farming, the main production results from the farming of rainbow trout for 95 % and other salmonids (brown trout, *Salmo trutta*). The segment of trout is still the most important fish production sector in terms of sold volume (39.9 thousand tonnes, 87 % of fish farming, excluding pond farming) and value (125.5 million Euros, 70 % of fish farming). The trout on growing (segment 2.2) represents 89 % of the whole trout aquaculture in weight and 86 % in value. The trout combined activities complete the global trout production. The saltwater fish farming is a small sector in France. The sales volume of sea bass and sea bream is 4.2 thousand tons with a corresponding turnover of 30 million Euros, where production volume and value sharing between hatcheries and nurseries (segment 3.1), cages (segment 3.4) and land-based facilities.

It should be also highlighted the production of sturgeon caviar, even there were produced 20.2 tonnes from only 4 companies, it achieved a value of almost 11.1 million Euros (statistical survey 2010, DPMA). The sturgeon's activity also includes some companies that are rearing to maturity females and sell to caviar producers. Caviar production is a new activity and return on investment due to a long life-cycle is a limiting factor in the development of the sector.

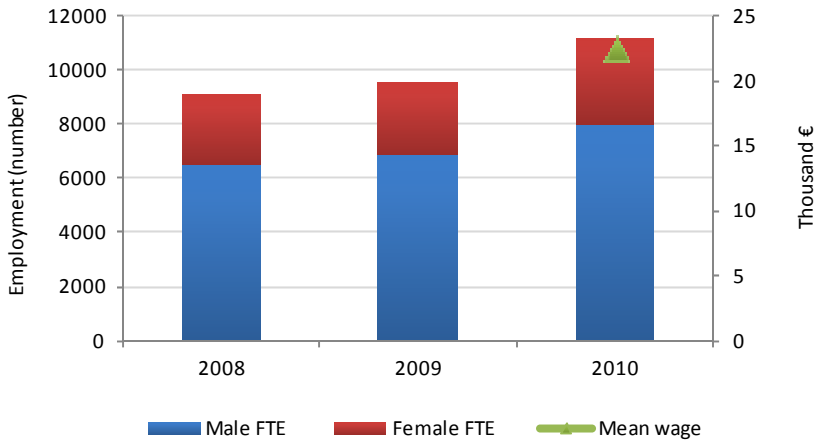
Table 5.9.1 Sector overview for France: 2008-2010.

	2008	2009	2010
Structure (number)			
Total enterprises	*2864*	*2986*	*3298*
<= 5 employess	2221	2277	2497
6-10 employess	364	385	432
> 10 employees	279	324	369
Employment (number)			
Total employees	*15961*	*17464*	*19814*
Male employees	10250	11240	12784
Female employees	5711	6224	7030
FTE	*9061*	*9536*	*11130*
Male FTE	6503	6887	7986
Female FTE	2558	2649	3144
Input & Production (thousand tonnes)			
Raw material volume: Feed			60.1
Raw material volume: Livestock			132.9
Production volume	257.3	265.4	313.3
Indicators			
FTE per enterprises	3.2	3.2	3.4
Average wage (thousand €)			22.7
Labour productivity (thousand €)			43.1

As already stated, the comparison between 2009 and 2010 is not possible due to the addition of new segments. Therefore the variation between 2009 and 2010 is not presented in the tables of this national chapter.

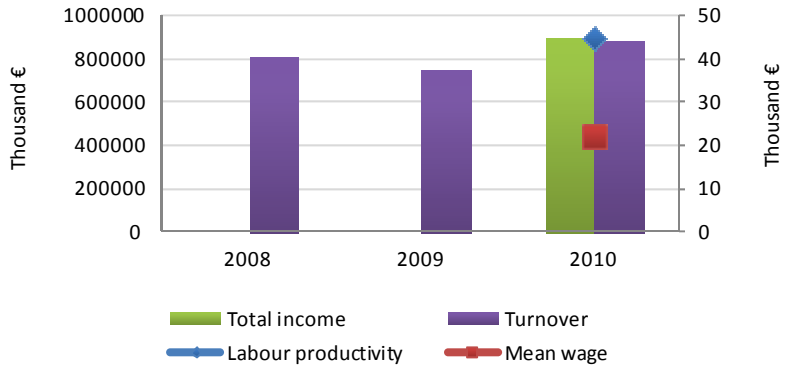
The shellfish sector account 2,930 companies, mainly small scale and family structure. They employ creating around 17,700 jobs which represent 9,500 full time equivalent jobs (FTE). During the latest years, the number of companies is decreasing. Seasonal jobs are very important in the shellfish farming. In addition, if the tasks in the leaseholds are carried out by the majority of men, the work in the establishment (packaging, orders, billing, ...) is rather feminine.

Figure 5.9.1 France employment trends: 2008-2010.



The number of freshwater fish farming companies are 333 in 2010 and the employment account for 1,500 jobs, corresponding to 1,100 FTE. Because of its recent development (since the beginning of the 80's), the saltwater fish farming is a small sector with only 35 companies. The total employees are 590 corresponding to 510 FTE. The national statistical survey doesn't cover the companies and employment of freshwater fish farming in ponds. Since the beginning of 2000, the number of firms and employment decrease. Several reasons can explain this situation : hardening regulatory requirements related to the Water Framework Directive (WFD) and the Water Act at the national level, the price stagnation of the latest years, the decline in trout consumption, strong competition from other fish (such as Norwegian salmon) on the market.

Figure 5.9.2 French income, wages and labour productivity trends: 2008-2010.



The weight of the oyster activities in the French aquaculture has a direct influence on the results of economic indicators. Since 2008, the French oyster industry is facing to exceptional mortalities of spat oysters, *Crassostrea gigas* (oyster less than a year) between 60 and 90 % of all breeding sites. The research shows that *OsHV1 µvar* virus plays an important role in explaining mortality and is clearly associated with bacteria of the genus *Vibrio splendidus*. The respective role of these agents remains to be determined. To cope with these mortalities, several strategies are lead. Companies have increased the number of spat collectors and their purchase of

juvenile in the hatcheries. They have also reduced the number of jobs in their companies. Considering it takes 3 years to produce an oyster, the impact of these mortalities of the economic performance will be measured in 2011. In order to mitigate this decrease in liquidity, firms receive subsidies.

Table 5.9.2 Economic performance for France: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income
Income (million €)						
Turnover	810.0	100%	760.1	100%	823.5	91%
Other income					43.0	5%
Subsidies					37.0	4%
Total income	*810.0*	*100%*	*760.1*	*100%*	*903.5*	*100%*
Expenditure (million €)						
Wages and salaries					142.9	16%
Imputed value of unpaid labour					109.6	12%
Energy costs					24.8	3%
Repair and maintenance					27.5	3%
Raw material costs: Feed costs					62.4	7%
Raw material costs: Livestock costs					202.1	22%
Other operational costs					103.2	11%
Total operating costs					*672.4*	*74%*
Capital Costs (million €)						
Depreciation of capital					88.4	10%
Financial costs, net					-12.6	-1%
Extraordinary costs, net					-1.8	0%
Capital value (million €)						
Total value of assets					1162.7	129%
Net Investments					74.1	8%
Debt					743.6	82%
Performance Indicators (million €)						
Gross Value Added					446.6	49%
Operating Cash Flow					231.1	26%
Earning before Interest and Tax					142.7	16%
Net Profit					155.3	17%
Capital Productivity					38.4	
Return on Investments (%)					12.3	
Financial position (%)					36.0	
Future Expectation Indicator (%)					-1.2	

Economic parameters for 2010 in table 5.9.2 do not correspond to all segments, but to the ones where all economic parameters are available. Data is available for segments corresponding to 93 % of the total turnover.

All segments make a net profit in 2010. Two segments have a part of net profit on the total income greater than 35 %: mussel culture on bottom (38 %), sea bass and sea bream in cages (35 %).These segments emerge with the highest relative gross value added (respectively 78 % and 67 % of the total income).

Below 10 % of profitability, we find the related segments of freshwater and marine fish. For the trout segments, beside the population of companies having a commercial status that are reported here, France have around 80 enterprises with a non commercial status (association, federal fish farms): generally of small size that produce essentially young fish for the restocking of rivers and don't have a real economic activity. There is a wide range of companies from small businesses that produce less than 10 tonnes of fish per year and some big companies whose annual production exceeds 1,000 tonnes. Small producers focus on local niche markets (sell live fish to stock ponds or river or for sports fishing) whereas medium and large companies are able to offer regularly sufficient quantities to supermarket chains. But they must face pressure from supermarkets, wholesalers and processing industries on prices. The latest years, the low price per kilo of trout and its stagnation limit margins and profitability of the activity. Large scale production has the capacity to support on-going technological development and improved productivity.

5.9.2 Structure and economic performance of the sector's main segments

Table 5.9.3 Economic performance for France at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income
Mussel Bottom						
Total Income (million €)	112.1	100%	119.4	100%	136.6	100%
Gross Value Added (million €)					106.9	78%
Operating Cash Flow (million €)					69.6	51%
Earning before Investments & tax (million €)					50.5	37%
Net Profit (million €)					52.5	38%
Volume of sales (thousand tonnes)	61.9		65.8		66.9	
Mussel Long line						
Total Income (million €)	9.0	100%	7.3	100%	5.8	100%
Gross Value Added (million €)						
Operating Cash Flow (million €)						
Earning before Investments & tax (million €)						
Net Profit (million €)						
Volume of sales (thousand tonnes)	5.2		6.2		5.1	

Other shellfish Bottom						
Total Income (million €)					133.4	100%
Gross Value Added (million €)					79.9	60%
Operating Cash Flow (million €)					42.9	32%
Earning before Investments & tax (million €)					24.1	18%
Net Profit (million €)					28.2	21%
Volume of sales (thousand tonnes)					45.1	
Oyster Bottom						
Total Income (million €)	452.7	100%	401.8	100%	450.8	100%
Gross Value Added (million €)					198.2	44%
Operating Cash Flow (million €)					97.2	22%
Earning before Investments & tax (million €)					57.1	13%
Net Profit (million €)					61.5	14%
Volume of sales (thousand tonnes)	127.3		123.9		123.9	
Oyster Other						
Total Income (million €)			9.3	100%	10.5	100%
Gross Value Added (million €)					7.7	73%
Operating Cash Flow (million €)					5.3	51%
Earning before Investments & tax (million €)					4.5	43%
Net Profit (million €)					5.1	49%
Volume of sales (thousand tonnes)			4.4		4.4	
Oyster rafts						
Total Income (million €)	19.1	100%	13.4	100%	14.7	100%
Gross Value Added (million €)					7.2	49%
Operating Cash Flow (million €)					1.8	12%
Earning before Investments & tax (million €)					-0.3	-2%
Net Profit (million €)					0.5	4%
Volume of sales (thousand tonnes)	6.8		5.7		5.8	
Sea bass & Sea bream cages						
Total Income (million €)	17.7	93%	15.1	100%	15.6	100%
Gross Value Added (million €)					10.4	67%
Operating Cash Flow (million €)					5.8	39%
Earning before Investments & tax (million €)					5.1	34%
Net Profit (million €)					5.1	35%
Volume of sales (thousand tonnes)	2.8		2.1		2.1	

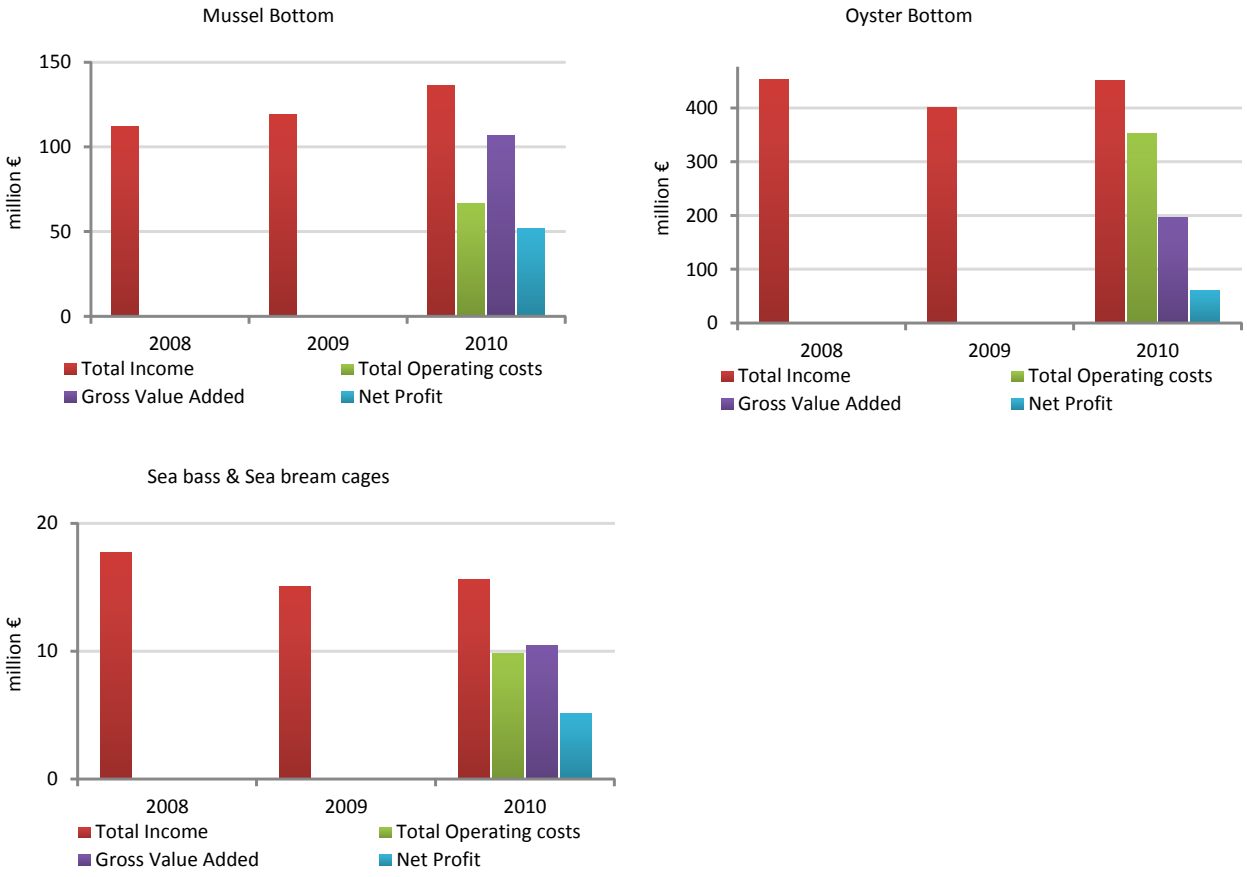
Trout combined						
Total Income (million €)	96.2	100%	17.6	100%	18.2	100%
Gross Value Added (million €)					7.5	41%
Operating Cash Flow (million €)					2.4	13%
Earning before Investments & tax (million €)					0.8	4%
Net Profit (million €)					1.1	6%
Volume of sales (thousand tonnes)	23.3		4.3		4.3	
Trout on growing						
Total Income (million €)	54.2	100%	128.4	100%	108.5	100%
Gross Value Added (million €)					25.8	24%
Operating Cash Flow (million €)					9.2	9%
Earning before Investments & tax (million €)					5.6	5%
Net Profit (million €)					6.1	6%
Volume of sales (thousand tonnes)	17.5		38.4		35.7	

Mussel bottom: due to the small structures, imputed value of unpaid labour is the main expense item (23 %). With wages and salaries, the weight of labour cost is around 44 %. Investments are important for this activity. That is why the depreciation of capital is the third item (22 %). In the case of mussel farming, the spat supply is exclusively on wild source, so the livestock costs are very limited.

Oyster bottom: Companies in this segment are very heterogeneous (i.e. in terms of size, turnover, etc.), and they have different strategies of production. Some of them focus on one stage of production (short cycle) instead of achieving the whole rearing cycle. The spat is supplied either by wild spat (produced by the farmers themselves thanks to collectors of different kinds in the regions located at the South of Loire, or purchased to these farmers by others), or spat produced in hatcheries, or both. Most hatchery produced spat are triploids. If the cost of the seed is higher than the wild seed, the growth of these oysters is faster (shorter production cycle) and rotation of stock is higher. It exists also a last phase of oyster production, the refining ("*affinage*") of oyster. This additional process, which consists in ending the rearing of oysters by a temporary immersion in marshland ponds ("*claires*"), provides a significant added-value to the final product. Only the oyster farms of Charente Maritime and Vendée practice this process. Generally, this segment has a 14 % profitability rate.

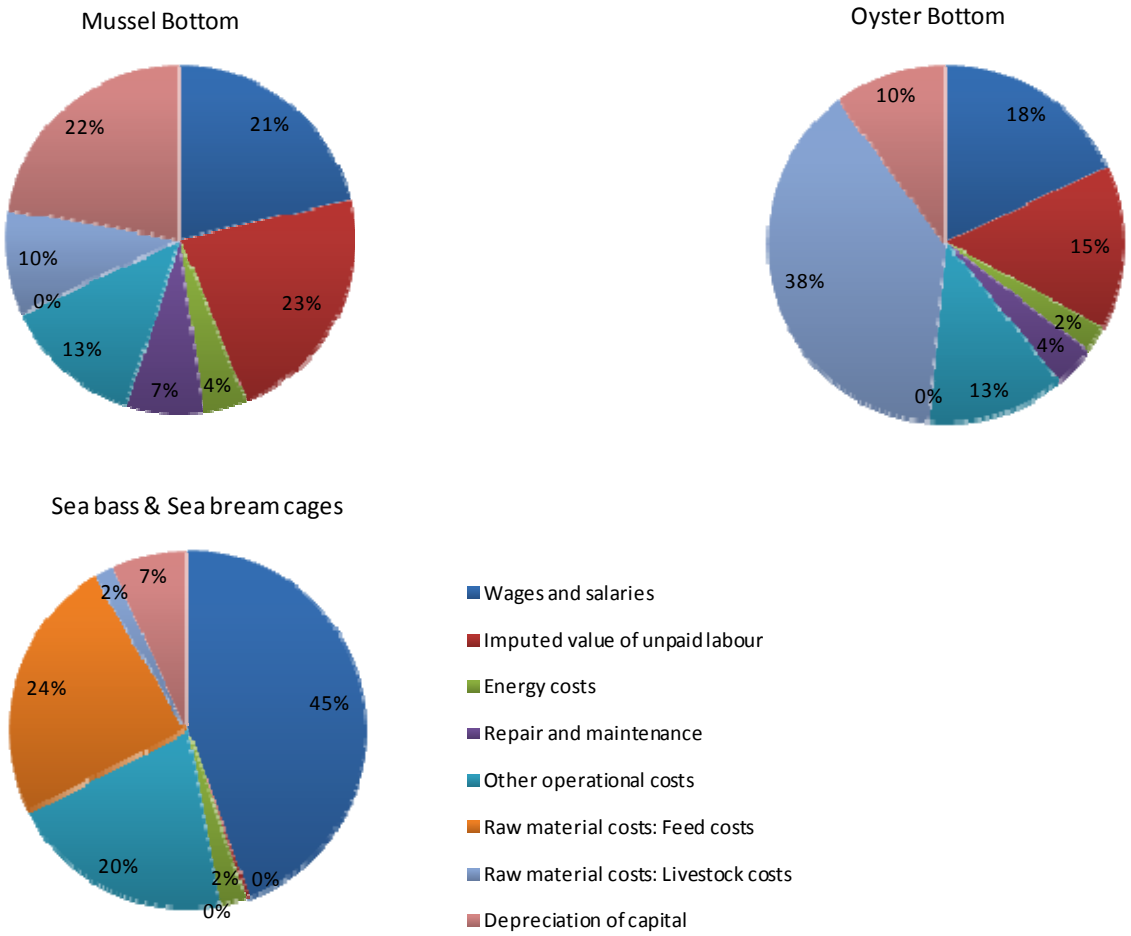
Livestock costs are the highest costs incurred by the sector and amount to 38 % of the total costs. Due to the mortalities of spat and juvenile oyster, this cost should be more important in the future. In 2010, the depreciation of capital represents 10 %. Given the oyster crisis, companies have also stopped their investments, and consequently a reduction of the depreciation of capital item is expected in the coming years.

Figure 5.9.3 Economic performance indicators per segments for France: 2010.



Sea bass and sea bream cage segment: the weight of wages and salaries item is very important (45 % of total costs). The dependence from raw material is limited to feed (24 % of total costs). The latest years, the price of feed for sea bass and sea bream has risen. Farmers fear that this cost item will become even heavier in the coming year.

Figure 5.9.4 Cost structure of main segments for France: 2010.



5.9.3 Trends and triggers

Over the last decade, the development of the oyster hatcheries represents a major innovation for the bivalve farming. This new practice enables the oyster farmers to become less dependent on natural spatfall and to dispose of triploid oyster having a better rapid growing. To cope with oyster mortalities, research programs in the field of genetic selection are conducted to provide more resistant oysters for professionals. Discussions within the profession shellfish are very important about an increased dependence of hatcheries.

The crisis also led some oyster farmers to consider diversifying in terms of species (Atlantic sea scallop - *Chlamys varia*, algae, flat oysters) and in terms of activities (pescatourism).

Lack of new suitable locations, environmental restriction and dependence on animal feed stuff are among the main problems faced by freshwater industry. Marine fish farming remains a small sector in France. Ultimately, its challenge to open up new production sites poses a risk to its development. Minimizing the environmental impact of fish farming is also one of the major concerns of farmers today.

For oyster and trout segment, despite the constraints (regulation, competition, mortality), aquaculture sectors must organize these activities to remain attractive.

Oyster and mussel farmers are looking for improving productivity. Alternative or complementary at the current systems, cultural techniques are experimenting in offshore sites (long-line, lantern, cages) and in inter-tidal areas (long line, suspended breeding systems). However, the geographical expansion of bivalve farming raises crucial issues, in terms of coastal zone management (user conflicts with fishing and tourism activities) and environment.

New developments also cover quality labelling. Bivalve farming companies are involved in many labelling schemes (French Label Rouge for green refined oysters from Marennes-Oléron, AOC (for protecting the geographical origin of mussels cultivated in Mont-Saint-Michel bay), mainly at regional scale in order to differentiate their products in the domestic market, which represents the main outlet for the French production. At European level, in 2012, the obtaining of the TSG (Traditional Speciality Guaranteed) for "*bouchot*" mussels allows the protection guaranty to European markets. Quality procedures were established in the landscape of French aquaculture. In 2001, the freshwater trout sector built the collective brand "*La Truite - Charte Qualité®*" whereas in 2001, the marine fish industry also adopted an interbranch collective brand "*Qualité - Aquaculture de France®*". Both brands contain criteria of production and marketing and are now together under the brand "*Charte Qualité - Aquaculture de nos Régions®*". Nowadays, around 70 % of the volumes are sold under this unique brand.

5.9.4 Data coverage and Data Quality

The comparison between 2009 and 2010 is not possible due to the addition of new segments. The 4 new segments which are added in 2010 in the global statistic are: "other marine fish on growing" (segment 6.2) is a mix of few but very different fish farms; "other shellfish rafts" (segment 10.1), "other shellfish long line"(segment 10.2), and "other shellfish bottom" (segment 10.3), merge firms which produce jointly oyster and mussel. Therefore the variation between 2009 and 2010 is not presented in the tables of this national chapter.

Economic parameters (turnover, subsidies, other income, total income, wages and salaries, imputed value of unpaid labour, energy costs, raw material costs: livestock costs, raw material costs: feed costs, repair and maintenance, other operational costs, depreciation of capital, financial costs net, extraordinary costs net, total value of assets, net investments, debt, raw material volume: livestock, raw material volume: feed) are not available for all segments, but the main ones. These economic parameters are available for segments corresponding to 93 % of the total turnover. Therefore, even if total data is presented for the whole French aquaculture sector, economic indicators have been calculated only using data for these main indicators where all economic data was available.

Data quality

in 2010, DPMA with LEMNA, an economy laboratory from Nantes University have set up a working group with 2 subgroups: shellfish farming, fish farming. Each subgroup has clarified how production data should be used to determine the membership of each enterprise to a particular DCF segment as no precise recommendation was found in the DCF regulation, especially on species level for shellfish. To improve the accuracy of sampling, the subgroup defined the stratification to be applied in each segment. The subgroups had also to characterize more precisely the content of each economic indicator.

For shellfish farming, the subgroup involves two enterprise accounts management centres that transmit economic data, on anonymous basis, from the accounting records of enterprises that they follow. To determine the membership of an enterprise to a segment and stratum, to give full detailed economic data, these centres collect additional data to the standard accounting records.

For shellfish farming, data collection was made from a sample of enterprises selected from the files of accounting and financial data kept by chartered accountant or financial management centres specialised in these economic sectors. The planned sample rate is from 15 to 20 %. The socioeconomic data of 274 enterprises in the shellfish farms segments (specialised in production of oysters and/or mussels) representing 9.3 % of the population.

Apart production and employment, economic data couldn't be transmitted for some segments: mussels and other shellfish on raft or long line. Enterprises in these segments are located on Mediterranean coast where the enterprise accounts management centres have just started to collect the additional data needed for our economic collection. Samples were in too small numbers and didn't represent properly the population. Economic data of 267 samples were used for a population of 2,795 enterprises (out of 2,930).

Table 5.9.4. Sampling rate and quality on Total income for shellfish farming

	Population (number)	Samples (number)	Total Income (€)	Contribution	Sampling rate	Coeff. Var.** (%)
Segments						
Mussel bottom	347	42	136553264	18.3	0.121	0.175
Oyster raft	258	3	14743287	2	0.012	0.351
Oyster bottom	1934	206	450824985	60.4	0.107	0.101
Oyster other	26	3	10491265	1.4	0.115	0.255
Other shellfish bottom	230	13	133430868	17.9	0.057	0.116
Total	2795	267	746043669	100	0.096	0.066

** estimator

The three most important segments (on/off bottom) contribute to 97 % of the total income of this sector. With a sampling rate of 11-12 %, the data quality (coefficient of variation) is under an acceptable value of 12 %. The next collection will try to increase the sampling rate of the segments that couldn't be transmitted or have a low quality.

Table 5.9.5. Sampling rate and quality on Total income for fish farming

	Population (number)	Samples (number)	Total Income (€)	Contribution	Sampling rate	Coeff. Var.** (%)
Segments						
Trout on growing	248	19	108540871	68.9	0.0770	0.310
Trout combined	85	12	18245552	11.6	0.1410	0.196
Sea bass & bream hatcheries	5	4	15050598	9.6	0.8000	0.200
Sea bass & bream cages	20	4	15626628	9.9	0.2	0.458
Total	358	39	157463649	100	0.1090	0.221

** estimator

Concerning the fish farm segments (production of trout, seabass, etc.) the socioeconomic data of 53 enterprises has been collected in 2011 through direct questioning to producers with the help of the CIPA. The checking of data validity coming from this source lead to keep only 44 samples including 4 relative to caviar production and 1 enterprise that had to be merged with "other marine fish" due to statistical confidentiality. The small number of saltwater fish farms, their specialised characteristics will presumably allow a higher sample rate, around 50 %.

Because of data validity checking, the achieved sampling was reduced for trout on growing and the quality didn't reach the expected level. Most generally in the fish farm sector, there is a big variation in data with few large size enterprises.

Confidentiality

To avoid problems with confidentiality, segments should in general include more than 3 enterprises and one enterprise shouldn't contribute to more than 85 % to the overall total. The production of "Other marine fish" segment is quite significant in terms of value, and even though this segment includes 10 companies, they are surveyed. In order to present detailed data collected from this segment, nearly all enterprises have agreed to participate in the production survey.

Outlook for 2011 and 2012

For France trout producers are expected to be better collected in 2012 than in 2011. The reason is that a new collaboration with a company that represents management centers will transmit economic data based on anonymous, accounting firms they follow. These companies are expected to represent 37 % of freshwater fish companies in the sample.

The increase in the number of firms in the sample segment of oyster rafts will improve the quality of data.

5.10 GERMANY

5.10.1 Overview of the sector

Germany is collecting data under the DCF for marine species only. But some data for the freshwater sectors are available and are presented in this overview. For the figures please have in mind that they only show the performance of one sector, the blue mussel farming in the North Sea. Oysters are produced at one plant in Germany as well. Yet, due to confidentiality reasons economic analysis does not include this specific segment.

Data for the year 2011 is available already. The Federal Statistical Office just recently published the data of its Aquaculture survey 2012, conducted according to the EU regulation 762/2008. Furthermore a yearly report, the "*Jahresbericht zur Deutschen Binnenfischerei*", is published on behalf of the Ministry for Agriculture, Food, and Consumer Protection which main source are the fishery authorities of the German states. Normally, every 10 years the "B*innenfischereierhebung*" is published by the Federal Statistical Office, but it has been skipped for the most recent volume. So the last version is from 2004 with data from 2003, for commercial farms only and applying a threshold of 100 m^2 for trout farming, or 5000 m^2 for carp production or at least 1 ton of production in technical facilities.

The most recent data are from the Aquaculture survey 2012[1]. According to the quality report of this survey all aquaculture facilities have been included. 4,762 facilities are reported with a production volume of 39,202 tonnes, including about 21,000 tonnes of marine aquaculture production of blue mussels. About 18,000 tonnes freshwater finfish production consisting of 11,000 tonnes of trout and salmonids and 5,400 tonnes of carps and cyprinids. 100 tonnes are from Crustaceans, roe and caviar and some algae. A statistic of the Federal agency for employment, shows 1,727 persons subjected to social insurance contributions including 711 marginal employees for marine and freshwater aquaculture at the date 30.09.2011. So seasonal workers and persons that are not subjected to social insurance contributions are not included in these figures.

The "*Jahresbericht zur Deutschen Binnenfischerei*"[2] for the year 2010, conducted on behalf of the federal ministry (BMELV), reports 483 trout and 168 carp main facilities, with 11,142 trout and 11,397 carp facilities as secondary and additional income source. 39 technical recirculation facilities and 22 net corral facilities are stated. Production volume of carps and cyprinids was 9,634 tonnes of carp for food consumption, 3,431 tonnes carps for stocking purposes and 1,085 tonnes other fish species with a turnover of 43.96 Million Euros. Production volume of trout and salmonids sum up to 28,223 tonnes, of which 22,230 are trout for consumption, 2,902 tonnes are trout for stocking and 3,091tonnes for other purposes. The value was 130.56 Million Euros.

In technical recirculation systems 1,666 tonnes were produced, including eel and caviar having a total value of 17.99 Million Euros. Production in net corrals totals 82.8 tonnes and a value of 488 thousand Euros.

[1] Federal Statistical Office. 2012. Erzeugung in Aquakulturbetrieben. Fachserie 3, Reihe 4.6.

[2] Brämick, Uwe. 2011. Jahresbericht zur Deutschen Binnenfischerei 2010.

For the year 2003, 3,343 facilities were reported in the "*Binnenfischereierhebung*"[3] with 7,696 persons employed (incl. Part-time and seasonal), counting to 2,404 FTE. Production for food use was around 13,275 tonnes in ponds, 27,670 in tanks and about 1,670 tonnes in net corrals. 1,424 facilities produced salmonids, 2,216 cyprinids and 405 other species, while 257 had no production in 2003. Data were only collected for freshwater aquaculture, so data for the blue mussel sector are not included.

Turning to DCF data, Germany reports only data for marine species and this means only the blue mussel sector. According to the technology used, no feed of livestock cost occur (see last year report). Vessels and enterprises sometimes merge and so number of enterprises change, but the number of licenses remains stable. Income relies on prices, but as the German blue mussels are of high quality with a lot of meat ratio, prices are normally quite high in comparison to for example Danish blue mussels. Employees get a share of the turnover, so wages vary.

Table 5.10.1 Sector overview for Germany: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*8*	*12*	*8*	*-33%*
<= 5 employess	8	12	8	-33%
6-10 employess	0	0	0	
> 10 employees	0	0	0	
Employment (number)				
Total employees	*10*	*10*	*12*	*20%*
Male employees	10	10	12	20%
Female employees	0	0	0	
FTE	*9*	*7*	*9*	*29%*
Male FTE	9	7	9	29%
Female FTE	0	0	0	
Input & Production (thousand tonnes)				
Raw material volume: Feed	0.0	0.0	0.0	
Raw material volume: Livestock	0.0	0.0	0.0	
Production volume	6.8	4.0	4.9	24%
Indicators				
FTE per enterprices	1.1	0.6	1.1	95%
Average wage (thousand €)	125.5	265.3	120.7	-54%
Labour productivity (thousand €)	735.8	383.1	282.9	-26%

[3] Federal Statistical Office. 2005. Binnenfischereierhebung 2004. Fachserie 3.

As the mussel sector is so small, table and figure 5.10.1 are of relevance only for the segment, but not for the totals as a country.

Figure 5.10.1 Germany employment trends: 2008-2010.

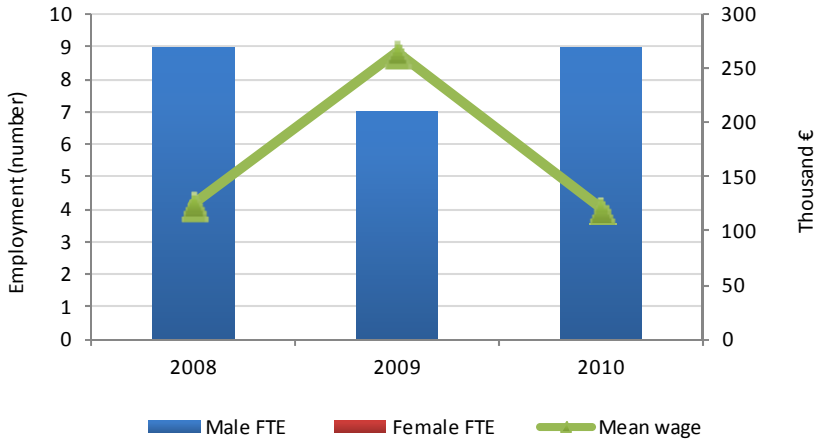


Figure 5.10.2 German income, wages and labour productivity trends: 2008-2010.

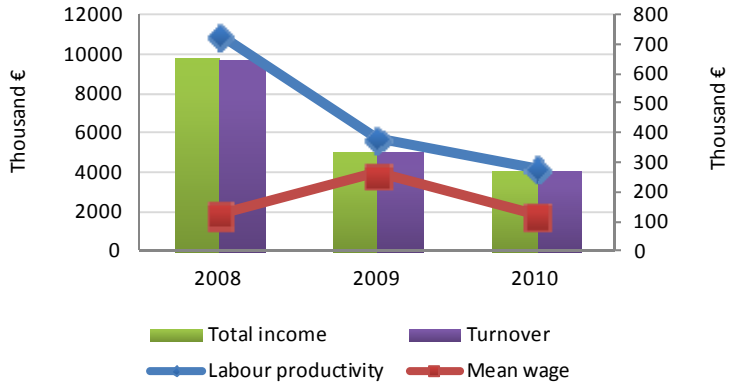


Table 5.10.2 Economic performance for Germany: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	9.7	99%	5.0	99%	4.1	100%	-18%
Other income	0.1	1%	0.0	1%	0.0	0%	-100%
Subsidies	0.0	0%	0.0	0%	0.0	0%	-100%
Total income	*9.8*	*100%*	*5.1*	*100%*	*4.1*	*100%*	*-19%*
Expenditure (million €)							
Wages and salaries	1.1	11%	1.9	37%	1.1	26%	-41%
Imputed value of unpaid labour	0.0	0%	0.0	0%	0.0	0%	
Energy costs	1.2	12%	0.5	11%	0.3	6%	-52%
Repair and maintenance	0.6	6%	0.3	7%	0.4	9%	12%
Raw material costs: Feed costs	0.0	0%	0.0	0%	0.0	0%	
Raw material costs: Livestock costs	0.0	0%	0.4	8%	0.0	0%	-99%
Other operational costs	1.4	14%	1.1	21%	0.9	23%	-12%
Total operating costs	*4.3*	*44%*	*4.2*	*83%*	*2.7*	*65%*	*-37%*
Capital Costs (million €)							
Depreciation of capital	1.5	16%	0.4	8%	1.1	27%	183%
Financial costs, net	0.3	3%	0.2	4%	0.1	3%	-37%
Extraordinary costs, net	0.0	0%	0.0	0%	0.0	0%	
Capital value (million €)							
Total value of assets	14.7	150%	14.3	283%	11.8	287%	-17%
Net Investments	0.5	5%	0.1	2%	0.0	0%	-82%
Debt	4.0	40%	2.9	57%	2.7	66%	-5%
Performance Indicators (million €)							
Gross Value Added	6.6	67%	2.7	53%	2.5	62%	-5%
Operating Cash Flow	5.5	56%	0.8	17%	1.5	35%	74%
Earning before Interest and Tax	4.0	41%	0.5	9%	0.4	9%	-19%
Net Profit	3.7	38%	0.3	5%	0.2	6%	-7%
Capital Productivity	45.1		18.7		21.5		
Return on Investments (%)	27.1		3.2		3.1		
Financial position (%)	73.0		80.0		77.1		
Future Expectation Indicator (%)	-7.2		-1.9		-9.1		

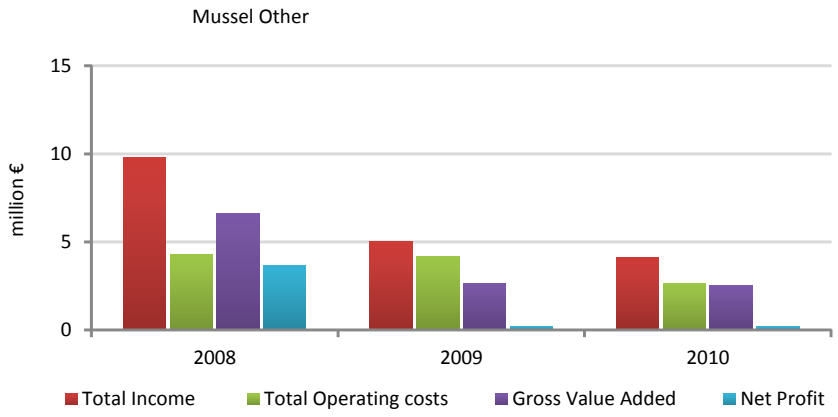
The economic performance of the sector over the years has been quite well but heavily relying on natural seed fall and so 2010 was more a bad year. There have been problems with seed fall for the last 10 years. This is the reason why producers started to collect seeds with long-lines in order to get more seed. A few also imported seed mussels from Ireland but this was forbidden by court decision due to environmental legislation. The profitability of the sector is quite high and owners are able to deal with years of smaller income. As the licenses for mussel farming in Schleswig-Holstein have just recently been prolonged, investment is now more secure and it is expected that the enterprise owners, known as open minded and innovative, will increase their investments in the next years.

5.10.2 Structure and economic performance of the sector's main segments

Table 5.10.3 Economic performance for Germany at segment level: 2008-2010.

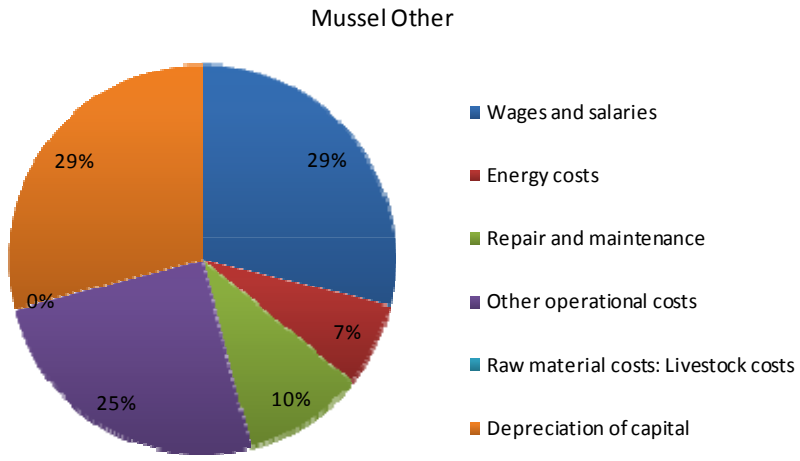
	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Mussel Other							
Total Income (million €)	9.8	100%	5.1	100%	4.1	100%	-19%
Gross Value Added (million €)	6.6	67%	2.7	53%	2.5	62%	-5%
Operating Cash Flow (million €)	5.5	56%	0.8	17%	1.5	35%	74%
Earning before Investments & tax (million €)	4.0	41%	0.5	9%	0.4	9%	-19%
Net Profit (million €)	3.7	38%	0.3	5%	0.2	6%	-7%
Volume of sales (thousand tonne)	6.8		4.0		4.9		24%

Figure 5.10.3 Economic performance indicators per segments for Germany: 2010.



The mussels segment therefore has no livestock or feed costs. The main costs are wages and salaries and depreciation of the capital. The cost structure has been investigated in 2006 thoroughly (see Buck et al., 2010) and so the relative cost shares are well known. Energy costs are relative small. This is partly due to cost sharing of the owners. Some vessels are doing harvest and service work for other mussel farmers and turnover is split afterwards.

Figure 5.10.4 Cost structure of main segments for Germany: 2010



5.10.3 Trends and triggers

The expectations for the future of the blue mussel sector for the season 2013 differ from the region Lower Saxony to the region Schleswig-Holstein. While producers in Schleswig-Holstein are quite optimistic, producers in Lower Saxony are suffering from a lack of seed mussels. For the year 2012 producers in both states are optimistic.

Effort is ongoing to introduce new marine aquaculture in Germany, but it is still on the research level.

5.10.4 Data coverage and Data Quality

Landing volume and value is from landing declaration and therefore very reliable. Cost data are from random survey with about half to two third of the owner responding to the questionnaire in the different years and results are compared and checked or plausibility with a detailed investigation of costs conducted in 2006 (Buck et al 2010)[4].

[4] Bela H. Buck, Michael W. Ebeling & Tanja Michler-Cieluch. 2010. Mussel cultivation as a co-use in offshore wind farms: potential and economic feasibility. Aquaculture Economics & Management, 14(4): 255-281.

Segment assignment was one according Regulation 93/2010. As the mussels are brought to none inter tidal waters, the segment "mussels other" was chosen. But with some reason it could also be assigned to "mussel bottom technique" to make it comparable with the Dutch blue mussel sector.

Data for the freshwater sector differ a lot. The reason for this beyond the mentioned issues like threshold is not known.

5.11 GREECE

5.11.1 Overview of the sector

Economic data for the aquaculture in Greece were not submitted for 2010 under the DCF. For the benefit of the reader, data on weight and value of the Geek aquaculture production, as reported by FAO, are presented in this analysis.

Aquaculture production weight decreased by 6.99 % between 2009 and 2010, and reached 113.5 thousand tonnes in 2009, while at the same period production value also decreased by 7.9 % to reach 366.8 million Euros in 2010 (FAO, 2012). Both, production weight and value for 2010 are lower than 2008 production weight and value.

Table 5.11.1 Production weight and value of the Greek aquaculture sector: 2008-2010.

	production volume (tonnes)			production value (thousand €)		
	2008	2009	2010	2008	2009	2010
Freshwater	3991	3093	3100	13501	11001	11025
Brackishwater	982	811	845	5327	5015	5178
Marine	110095	118107	109541	352923	382197	350566
Total	*115068*	*122011*	*113486*	*371751*	*398213*	*366769*

(source: FAO, 2012)

Production of fresh water aquaculture remained stable between 2009 and 2010. Production of brackish water aquaculture rose by 4.19 % between 2009 and 2010, and reached 845 tonnes in 2010, while at the same period production value also rose by 3.25 % to reach 5,178 million Euros in 2010. Production of marine water aquaculture decreased by 7.25 % between 2009 and 2010, reaching 109.5 thousand tonnes in 2010; while at the same period production value also decreased by 8.28 % to reach 350.6 million Euros in 2010.

Seabream and seabass production weight decreased by 10.37 % and 7.53 % respectively between 2010 and 2009, while production value also decreased by 10.16 % and 7.31 %, respectively. The decline of seabream and seabass production during 2010 may be attributed to the decisions made by the Greek producers to reduce production volume as an effect of the rapid price decline during 2008-2009.

Table 5.11.2 Top 5 species by aquaculture production weight and value in Greece: 2010.

Species	production volume (tonnes)
Gilthead seabream	54250
European seabass	31100
Mediterranean mussel	22500
Rainbow trout	2600
Marine fishes nei	1750

Species	production value (thousand €)
Gilthead seabream	196752
European seabass	134201
Mediterranean mussel	11260
Marine fishes nei	9283
Rainbow trout	7287

(source: FAO, 2012)

Greek production of seabream and seabass is expected to decline further in 2011 affected by the reduced working capital availability through bank loans in the Greek economy. During 2011, a special framework for aquaculture spatial planning came into force in Greece. This new framework is expected to alleviate legal problems for the current aquaculture companies and contribute to the further development of aquaculture in Greece.

Investment capital of Georgian origin is trying to concentrate the Greek seabream and seabass industry the past few years. The investment capital managed to control one company listed at the Athens stock exchange market during 2012 and owns more than 20 % of the shares in the two largest aquaculture companies listed at the Athens stock exchange market.

5.12 HUNGARY

5.12.1 Overview of the sector

The Hungarian aquaculture sector produced 14.2 thousand tonnes in 2010. This production was valued 28.1 million Euros (FAO, 2012). All aquaculture production is freshwater, because it is a landlocked country.

Table 5.12.1 Production weight and value of the Hungarian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	15.7	14.8	14.2
production value (thousand €)	31.2	27.1	28.1

(source: FAO, 2012)

Common carp was the main species produced in 2010, with 70 % of the total production in weight and 69 % in value. Other relevant species are north African catfish, silver carp and grass carp.

Table 5.12.2 Top 5 species by aquaculture production weight and value in Hungary: 2010.

	production volume (tonnes)
Species	
Common carp	9927
North African catfish	1810
Silver carp	1081
Freshwater fishes nei	619
Grass carp (=White amur)	437

	production value (thousand €)
Species	
Common carp	19516
North African catfish	4613
Silver carp	826
Grass carp (=White amur)	700
Wels (=Som) catfish	659

(source: FAO, 2012)

5.13 IRELAND

5.13.1 Overview of the sector

Irish aquaculture production volume over the 2008 to 2010 period has marginally increased overall from 45,000 tonnes to 46,600 tonnes (Table 5.13.1). Overall turnover (and total income) has increased steadily over the period, from 94.3 million in 2008, to 122.5 million Euros in 2010 (Fig. 5.13.1). Increased production volume and unit value per tonne of the salmon and Gigas oyster sectors of the industry have been the chief contributors of this value trend. An increasing proportion of Irish Salmon is organically produced and marketed (approximately 75 % currently). Demand in the more lucrative organic salmon market is outstripping supply. Irish oyster production is benefiting from recent marketing and branding campaigns and also from current production difficulties being experienced in France. In contrast, mussel production over the period has dropped from 27,000 tonnes to 22,000 tonnes due to both seed supply and market demand decreases for bottom mussels and market demand slump and quality issues in the rope mussel sector. The potential to increase production in some sectors had been hampered by a shortage of available licensed sites.

Table 5.13.1 Sector overview for Ireland: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*303*	*303*	*303*	*0%*
<= 5 employess	232	232	230	-1%
6-10 employess	41	41	43	5%
> 10 employees	30	30	30	0%
Employment (number)				
Total employees	*1964*	*1951*	*1719*	*-12%*
Male employees	1802	1807	1573	-13%
Female employees	162	144	146	1%
FTE	*1287*	*976*	*956*	*-2%*
Male FTE	1257	908	882	-3%
Female FTE	71	67	74	10%
Input & Production (thousand tonnes)				
Raw material volume: Feed	13.4	16.6	20.5	23%
Raw material volume: Livestock	25.1	25.3	23.9	-6%
Production volume	45.0	47.4	46.4	-2%
Indicators				
FTE per enterprices	4.3	3.2	3.2	-2%
Average wage (thousand €)	24.2	29.7	26.6	-10%
Labour productivity (thousand €)	21.5	34.2	49.9	46%

Employment in Irish aquaculture over the 2008 to 2010 period has declined steadily overall (Fig. 5.13.1) from a total of 1,964 to 1,719 persons. FTE decline for the period from 1,287 to 959 persons. Shellfish production decline, principally due to the mussel sector, is reflected by employment decreases in the two mussel segments. Employment in other sectors has either remained steady, on average, over the 3 year period, as for gigas oysters ('Oyster Other') or shown only a modest increase, as for salmon ('Salmon cages'). Productivity has increased while the mean wage has remained stable overall (Fig. 5.13.1).

Figure 5.13.1 Ireland employment trends: 2008-2010.

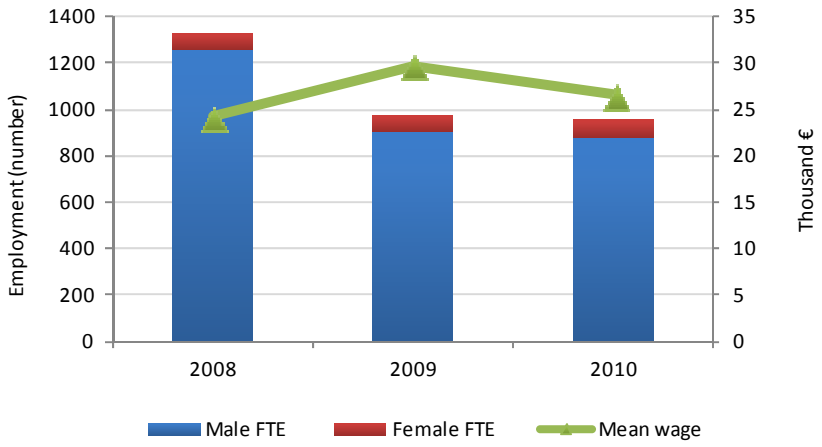


Figure 5.13.2 Irish income, wages and labour productivity trends: 2008-2010.

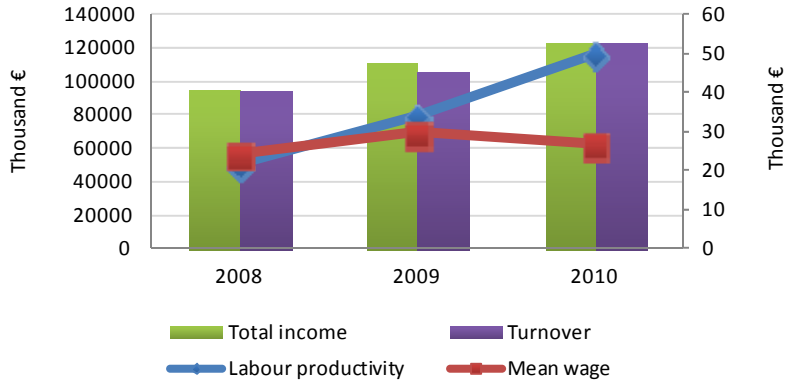


Table 5.13.2 Economic performance for Ireland: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	94.3	99%	106.6	95%	122.5	100%	15%
Other income	0.9	1%	1.5	1%	0.6	0%	-64%
Subsidies	0.0	0%	0.1	0%	0.0	0%	-100%
Total income	*95.2*	*100%*	*112.7*	*100%*	*123.1*	*100%*	*9%*
Expenditure (million €)							
Wages and salaries	23.7	25%	25.0	22%	25.3	21%	1%
Imputed value of unpaid labour	7.4	8%	4.0	4%	0.1	0%	-97%
Energy costs	1.9	2%	1.7	1%	3.2	3%	91%
Repair and maintenance	7.9	8%	7.6	7%	5.3	4%	-30%
Raw material costs: Feed costs	17.5	18%	28.6	25%	25.5	21%	-11%
Raw material costs: Livestock costs	12.6	13%	10.9	10%	7.5	6%	-31%
Other operational costs	27.5	29%	25.9	23%	34.0	28%	31%
Total operating costs	*98.5*	*104%*	*103.7*	*92%*	*100.9*	*82%*	*-3%*
Capital Costs (million €)							
Depreciation of capital	4.0	4%	4.5	4%	13.3	11%	199%
Financial costs, net	1.7	2%	1.4	1%	2.4	2%	76%
Extraordinary costs, net	0.0	0%	0.0	0%	0.0	0%	
Capital value (million €)							
Total value of assets	133.1	140%	166.9	148%	171.1	139%	2%
Net Investments	6.7	7%	18.5	16%	7.8	6%	-58%
Debt	48.9	51%	63.5	56%	105.8	86%	66%
Performance Indicators (million €)							
Gross Value Added	27.7	29%	33.4	30%	47.7	39%	43%
Operating Cash Flow	-3.4	-4%	8.9	8%	22.2	18%	148%
Earning before Interest and Tax	-7.4	-8%	4.5	4%	8.9	7%	98%
Net Profit	-9.1	-10%	3.1	3%	6.5	5%	108%
Capital Productivity	20.8		20.0		27.9		
Return on Investments (%)	-5.6		2.7		5.2		
Financial position (%)	63.2		61.9		38.2		
Future Expectation Indicator (%)	2.0		8.4		-3.3		

5.13.2 Structure and economic performance of the sector's main segments

Atlantic Salmon ('Salmon Cages' Seg. 1.4).

Salmon production has increased over the period, from just over 9,000 tonnes in 2008 to over 15,000 tonnes in 2010. The proportion of organic to premium (conventionally produced) product has increased over the period, increasing average product unit value and therefore contributing to the increase in overall turnover for the sector. There had been a significant capital investment in the sector in 2008 and 2009 as well as a drive to exploit the organic niche market. The data indicates (Fig. 5.13.3) that the sector was profitable in 2010, during which no farther net investment was indicated. The sector added positively to the economy over the period, as indicated by the increase in GVA and income. Operating costs however continue to rise with the cost of feed being the single biggest cost factor to the industry (Fig. 5.13.4).

Gigas Oyster ('Oyster Other' Seg. 8.4).

Oyster production over the period has recovered from a production slump in 2007. Both volume and unit value have increased steadily from 6,188 tonnes at 2,000 Euros per tonne in 2008 to 7,051 tonnes at 2,919 Euros per tonne in 2010. Greater specialisation in culturing a particular phase of the production cycle for a given site for optimum return is occurring. This plus other changes in husbandry and marketing strategy, plus a relatively disease free status have all contributed to growth in the sector.

The data indicates (Fig.5.13.3), as expected from the above, that income and GVA are growing and that the industry had returned to profitability by 2010, contributing positively to the economy. Overall costs have decreased over the period but these such as seed supply and distribution are still considerable.

It can be seen from the data (Fig. 5.13.4), that 'wages and salaries and 'raw material costs; stock input and 'other operational costs are very large components of the overall costs. The Irish industry is very labour intensive and most operations are small with FTE per tonnage produced being relatively high compared to the ratio for the few large operations in Ireland. Currently the Irish industry is an ongrowing one and almost entirely depends on importation of raw material (seed) supply from France and Britain and the level of seed supply there. The Irish industry is a captive market regarding Seed supply and costs therefore are proportionately higher. 'Other operational costs' include distribution to market. Distribution costs will always be proportionately higher for Ireland, not being part of the European mainland where the market is.

Rope Mussel ('Mussel Longline' Seg. 7.2).

Production over the period has gradually declined in volume and unit value owing to a declining market demand. Despite this, the data indicates a decrease in operating costs and an increase in GVA and profitability. Increased mechanisation and a decrease in employment and attendant costs (FTE down from 213 in 2008 to 216 in 2010). The sector is indicated as contributing positively to the economy (Fig 5.13.3).

The industry continues to be very labour intensive as seen from the proportion of costs attributed to wages and salaries (Fig. 5.13.4). Depreciation costs are very high in the industry and may be attributable in part to the high rate of wear and tear on farm structures and equipment on relatively exposed sites. Other operational costs are proportionally lower than for the oyster industry, due in part because the rope mussel industry members sell to local processor, thereby avoiding large distribution costs associated with exporting abroad. Ultimately, most product is exported but the costs are born to a far larger degree by mussel processors.

Table 5.13.3 Economic performance for Ireland at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Mussel Bottom							
Total Income (million €)	17.3	100%	13.2	100%	9.2	100%	-30%
Gross Value Added (million €)	2.5	14%	2.8	21%	5.0	54%	76%
Operating Cash Flow (million €)	-0.5	-3%	0.0	0%	1.8	19%	35687%
Earning before Investments & tax (million €)	-2.1	-12%	-1.7	-13%	-7.4	-81%	328%
Net Profit (million €)	-3.2	-18%	-2.3	-17%	-8.9	-97%	288%
Volume of sales (thousand tonnes)	17.0		17.5		13.2		-25%
Mussel Long line							
Total Income (million €)	6.8	100%	5.5	100%	6.6	100%	19%
Gross Value Added (million €)	3.4	51%	3.9	70%	5.5	83%	41%
Operating Cash Flow (million €)	-0.1	-2%	1.8	32%	4.1	62%	132%
Earning before Investments & tax (million €)	-0.3	-5%	1.3	24%	3.3	49%	141%
Net Profit (million €)	-0.3	-5%	1.2	22%	2.8	43%	129%
Volume of sales (thousand tonnes)	10.1		9.0		8.8		-2%
Oyster Bottom							
Total Income (million €)	1.3	100%	1.5	100%	0.9	100%	-40%
Gross Value Added (million €)	1.2	91%	1.4	94%	0.8	91%	-42%
Operating Cash Flow (million €)	-3.2	-242%	-0.7	-46%	0.7	84%	-210%
Earning before Investments & tax (million €)	-3.2	-242%	-0.7	-46%	0.7	84%	-210%
Net Profit (million €)	-3.2	-243%	-0.7	-47%	0.7	84%	-209%
Volume of sales (thousand tonnes)	0.4		0.4		0.2		-39%
Oyster Other							
Total Income (million €)	12.5	100%	13.9	100%	20.7	100%	49%
Gross Value Added (million €)	3.8	31%	5.2	38%	11.3	55%	117%
Operating Cash Flow (million €)	-5.4	-43%	0.3	2%	6.8	33%	2065%
Earning before Investments & tax (million €)	-6.8	-54%	-1.1	-8%	5.3	26%	-563%
Net Profit (million €)	-6.9	-55%	-1.3	-9%	5.2	25%	-515%
Volume of sales (thousand tonnes)	6.2		6.5		7.1		9%

Salmon cages							
Total Income (million €)	47.1	100%	65.4	100%	77.6	100%	19%
Gross Value Added (million €)	12.7	27%	17.0	26%	23.6	30%	39%
Operating Cash Flow (million €)	5.1	11%	3.6	5%	10.2	13%	186%
Earning before Investments & tax (million €)					9.3	12%	
Net Profit (million €)					9.3	12%	
Volume of sales (thousand tonnes)							
Salmon Hatcheries & nurseries							
Total Income (million €)	1.7	4%	1.9	3%	2.0	3%	7%
Gross Value Added (million €)	0.5	1%	0.7	1%	1.0	1%	38%
Operating Cash Flow (million €)	-0.1	0%	0.1	0%	-0.1	0%	-168%
Earning before Investments & tax (million €)	-0.2	0%	0.0	0%	-0.2	0%	1346%
Net Profit (million €)	-0.2	0%	0.0	0%	-0.2	0%	548%
Volume of sales (thousand tonnes)	0.1	0%	0.2		0.1		-35%

Figure 5.13.3 Economic performance indicators per segments for Ireland: 2010.

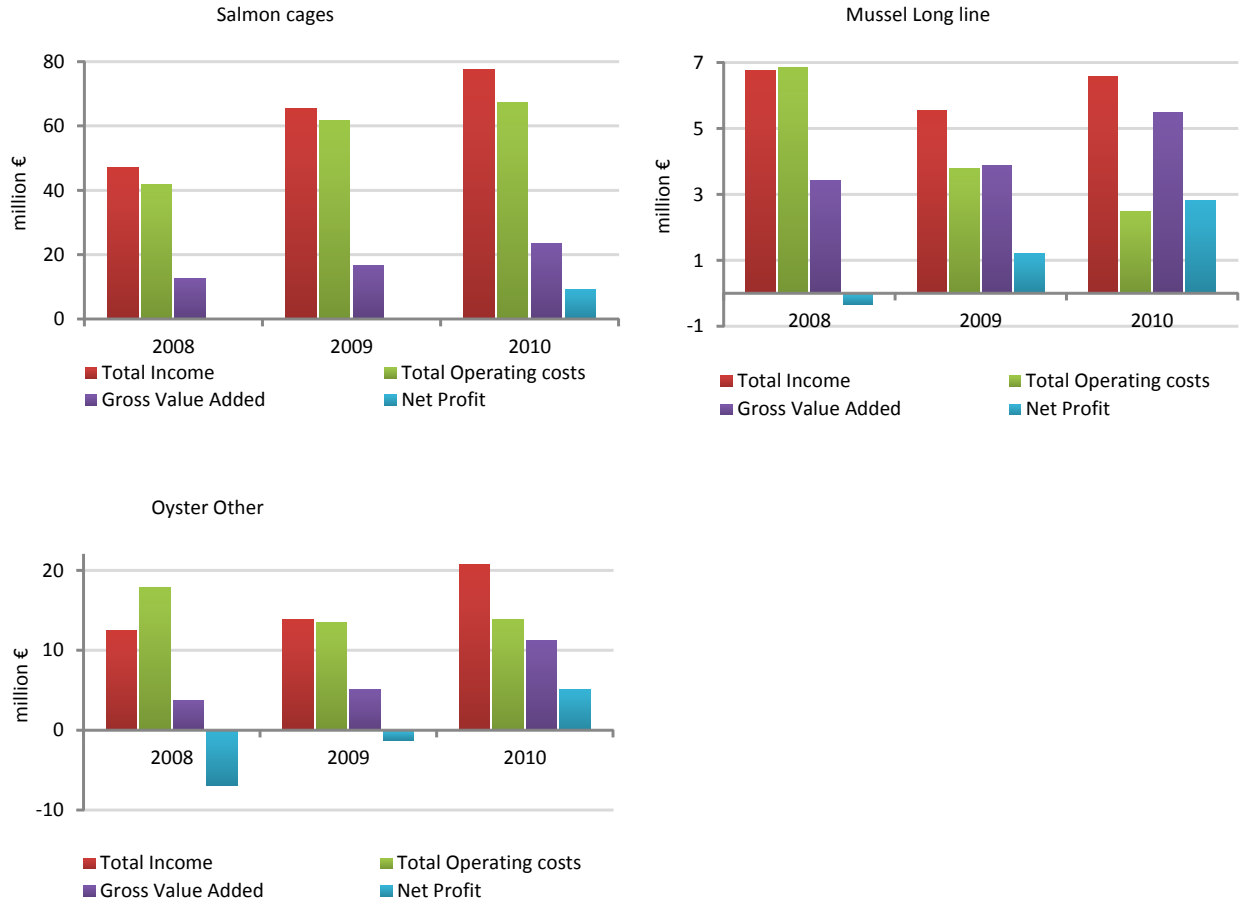
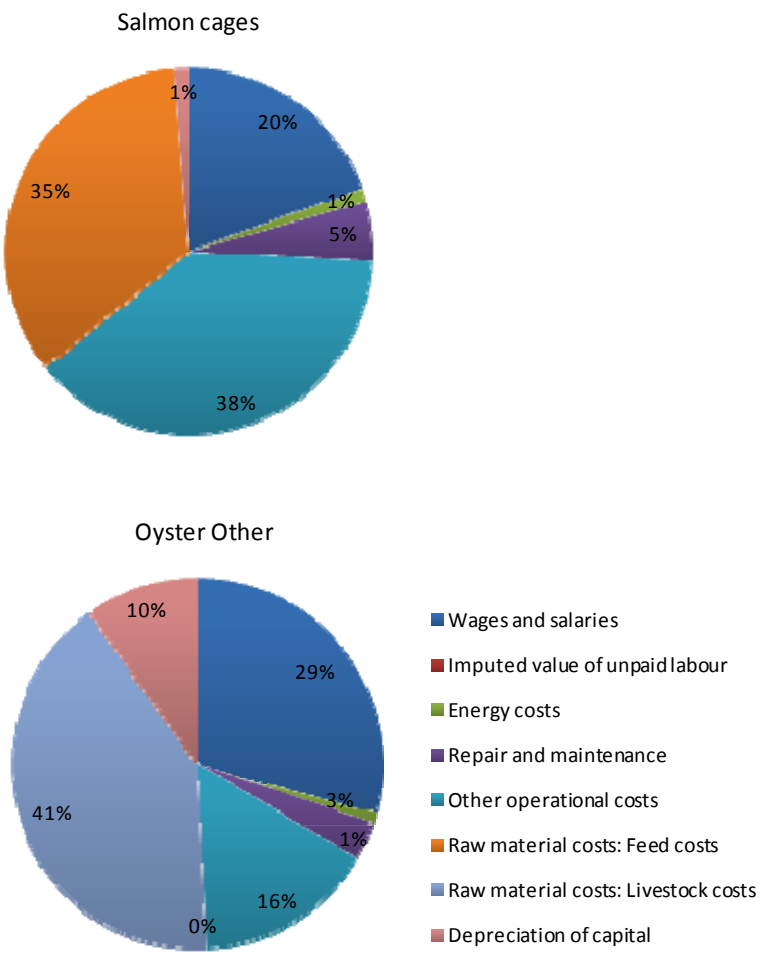


Figure 5.13.4 Cost structure of main segments for Ireland: 2010



5.13.3 Trends and triggers

Aquaculture production volume value and employment for the R.O.I. over the period 2011 to 2013 is not likely to grow overall and volume may actually decline for the period. This is due to the occurrence of disease and parasitic infestation in two principal sectors and to continuing market demand depression and seed supply in another two.

Amoebic gill disease appeared within the salmon and salmon smolt stock in 2012, seriously affecting supply to the salmon ongrowing sector for 2012 and 2013. *Karenia Mikimotoi* has appeared in the oyster stock of one major oyster production bay that previously had been free of this destructive organism. Stock volumes are expected to be seriously affected by this development. Seed availability remains very scarce for the mussel bottom sector, while market demand and prices for both bottom and longline mussel sectors are expected to remain static at best.

5.13.4 Data coverage and Data Quality

Variables surveyed by census; production and employment data, is based or derived from an 80 % return rate or more by entity number of the total population of aquaculture practitioners for the period 2008 to 2010. As the proportion of entities not returning tend to be small producers, the proportion of national tonnage and turnover required to be estimated is therefore smaller again. The 80 % return rate from producers has been consistent as has the method of estimating the production of non returnees; either using estimates from the local aquaculture officer or the most recent data of the company held.

Operating costs variables have been more difficult to get consistent and reliable data for as these can only be obtained from the producers themselves or from their accountant. The majority of companies are small with just one to two full time staff, including the directors and therefore accountant hire is kept to a minimum. Such Companies are only obliged by law to submit abridged accounts to the Company Registration Office, from whose website and others, abridged accounts can be accessed. Variables concerned with assets, liabilities and depreciation that previously were not available for the first data call, are becoming so and are being fed into the templates. The data for these variables is improving. Currently the percentage return rate for the frame population (commercial entities) of the sample survey for 2010 varies from 15.7 % to 19.3 %. For 2008 'feed costs' and 'Feed volume' variables are still based on very low returns (6-9 %), though FCRs based on reliable production tonnage estimates, could be used. Otherwise the return rate for 2008 sample survey ranges from 10-11 % while 2009 sample survey variables range from 11 to 15 % of the frame population. The sample survey targeted 20 % of the frame population for the three year period.

Segment data as far as possible is homogenous and representative. One exception at present is the available data for 'Mussel Bottom (Seg. 7.3)' for 2010. The 'financial' variables of this segment covered by sample survey, may be skewed towards a particular region of national production and this will be updated if more representative data can be found for the segment variables concerned.

5.14 ITALY

The Italian aquaculture sector produced 153.4 thousand tonnes in 2010. This production was valued 333.2 million Euros (FAO, 2012). Even if Italian aquaculture data was submitted in the data call, it refers to the sample they obtained from the survey, and not to the entire population. Therefore, an introduction using FAO data is presented, and DCF data is nonetheless presented in the tables and figures for the Italian national chapter, but should be considered that only refer to the sample and not the total population.

Table 5.14.1 Production weight and value of the Italian aquaculture sector: 2008-2010.

	production volume (thousand tonnes)			production value (thousand €)		
	2008	2009	2010	2008	2009	2010
Freshwater	39.3	39.3	38.6	169.2	246.2	104.5
Shellfish	95.9	109.7	101	99.3	140.8	136.5
Marine	13.8	13.4	13.8	110.2	88.4	92.1
Total	149.0	162.4	153.5	378.6	475.4	333.2

(source: FAO, 2012)

Japanese carpet shell was the main species produced in value terms in 2010, with 28 % of the total production in value and 23 % in weight. Followed by rainbow trout representing 24 % and 22 %, European seabass with 13 % and 4 %, Mediterranean mussel with 12 % and 42 %, and seabream with 12 % and 4 % of the total weight of production and value, respectively. Other important species are European eel, sturgeons, sea trout, etc.

Table 5.14.2 Top 5 species by aquaculture production weight and value in Austria: 2010.

	production volume (tonnes)
Species	
Mediterranean mussel	64.3
Japanese carpet shell	35.7
Rainbow trout	33.2
European seabass	6.5
Gilthead seabream	6.3

	production value (thousand €)
Species	
Japanese carpet shell	91.8
Rainbow trout	80.3
European seabass	44.8
Mediterranean mussel	40.5
Gilthead seabream	39.3

(source: FAO, 2012)

5.14.1 Overview of the sector

Aquaculture in Italy began as traditional farming of freshwater species, mainly trout, carp and sturgeon. Trout production continues to be one of the most important fish production sectors in terms of turnover and volume. In the 2009, the aquaculture sector contributed to around 40% in volume and 28% in value on the total Italian fishery production (according EUROSTAT data). Currently, the Italian aquaculture sector is characterised by high levels of specialisation, industrialisation and large scale production systems. Italy is one of the fifth largest aquaculture producing states in Europe.

The period under review is marked by variations in costs and revenues, resulting from efficiency losses in the production process. The Italian aquaculture production structure can be described as stiff in terms of invested capital compared to turnover, i.e. turnover of capital is less than unity, and fixed assets constitute a heavy share of capital. The sector is also affected by large cost variations, particularly in raw materials (feed and fry), and high energy costs. Large variations in these costs impact on the income statement and lessen the sector's negotiating power in the distribution channel.

Total legal entities in the aquaculture sector numbered 826 in 2007, but has since decreased to 754 in 2010. Up to 2008, the Italian aquaculture sector was represented by small size enterprises, dominated by family run business with no more than 5-10 employees. More recently, the number of small size enterprises has decreased and, in many cases, larger firms have taken over these smaller ones.

The ‘legal status’ firms in the shellfish segment are mostly co-operative organisations, where every worker is also a member of the organisation, and consortiums operate through a government grant aimed at managing the marine environment. The macro-aggregate ‘shellfish’ is labour intensive and volatile energy costs, mainly fuel for vessels, are some of the reasons for the high production cost in both segments (clams and mussels).

Regarding fish-cultured species, the most representative segments are ‘trout combined’ and ‘sea bass and sea bream’ in tanks and cages. Sea bream and sea bass fish farms are capital intensive, using high value-added technology. Investment in these segments is heavily directed towards adopting more eco-friendly technologies to help lessen their negative environmental impacts. Health care and safety costs, as well as union agreements, make this segment one of the sectors with the highest labour costs among European countries and other direct competitors in the Mediterranean region. On average, labour costs (cages) average around 24% of operating costs. This value is higher for the on-growing segment (Seg.3.2), where labour costs can reach up to 40% of operating costs.

Table 5.14.3 Sector overview for Italy: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises				
<= 5 employess				
6-10 employess				
> 10 employees				
Employment (number)				
Total employees	*615*	*1521*	*768*	*-50%*
Male employees	546	1422	670	-53%
Female employees	69	99	98	-1%
FTE				
Male FTE				
Female FTE				
Input & Production (thousand tonnes)				
Raw material volume: Feed	11.0	6.8	4.1	-39%
Raw material volume: Livestock	633.7	12.1	738.0	6004%
Production volume	31.6	32.5	38.2	18%
Indicators				
FTE per enterprises				
Average wage (thousand €)	31.9	10.4	28.7	177%
Labour productivity (thousand €)	-35.2	29.8	102.1	243%

Figure 5.14.1 Italy employment trends: 2008-2010.

Table 5.14.4 Economic performance for Italy: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	56.6	96%	95.8	95%	123.8	94%	29%
Other income	2.3	4%	4.3	4%	7.1	5%	66%
Subsidies	0.3	0%	0.4	0%	1.1	1%	174%
Total income	*59.2*	*100%*	*100.5*	*100%*	*132.0*	*100%*	*31%*
Expenditure (million €)							
Wages and salaries	18.9	32%	15.7	16%	22.1	17%	40%
Imputed value of unpaid labour	0.7	1%	0.0	0%	0.0	0%	-100%
Energy costs	6.4	11%	14.0	14%	3.2	2%	-77%
Repair and maintenance	4.5	8%	7.4	7%	1.2	1%	-84%
Raw material costs: Feed costs	11.3	19%	12.9	13%	15.4	12%	19%
Raw material costs: Livestock costs	50.3	85%	13.3	13%	23.7	18%	78%
Other operational costs	8.1	14%	7.2	7%	9.1	7%	27%
Total operating costs	*100.2*	*169%*	*70.6*	*70%*	*74.6*	*57%*	*6%*
Capital Costs (million €)							
Depreciation of capital	3.6	6%	3.8	4%	7.0	5%	87%
Financial costs, net	2.2	4%	1.8	2%	3.2	2%	74%
Extraordinary costs, net	1.5	3%	0.8	1%	1.4	1%	67%
Capital value (million €)							
Total value of assets	56.2	95%	130.4	130%	295.9	224%	127%
Net Investments	8.4	14%	25.7	26%	74.8	57%	191%
Debt	51.0	86%	69.5	69%	179.9	136%	159%
Performance Indicators (million €)							
Gross Value Added	-21.6	-37%	45.3	45%	78.4	59%	73%
Operating Cash Flow	-41.0	-69%	29.9	30%	57.4	43%	92%
Earning before Interest and Tax	-44.6	-75%	26.2	26%	50.4	38%	93%
Net Profit	-46.7	-79%	24.3	24%	47.2	36%	94%
Capital Productivity	-38.5		34.7		26.5		
Return on Investments (%)	-79		20		17		
Financial position (%)	9		47		39		
Future Expectation Indicator (%)	9		17		23		

5.14.2 Structure and economic performance of the sector's main segments

Table 5.14.5 Economic performance for Italy at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Clam Bottom							
Total Income (million €)	19.7	100%	47.8	100%	5.3	100%	-89%
Gross Value Added (million €)	4.5	23%	28.8	60%	4.1	79%	-86%
Operating Cash Flow (million €)	-0.6	-3%	23.2	48%	3.4	64%	-85%
Earning before Investments & tax (million €)	-1.9	-9%	22.5	47%	3.1	59%	-86%
Net Profit (million €)	-2.1	-11%	21.8	46%	3.0	58%	-86%
Volume of sales (thousand tonnes)	5.4		9.9		1.8		-81%
Mussel Long line							
Total Income (million €)	12.8	100%	15.3	100%	21.7	100%	42%
Gross Value Added (million €)	-33.0	-257%	6.4	42%	4.7	22%	-26%
Operating Cash Flow (million €)	-40.3	-314%	1.8	11%	-1.8	-8%	-204%
Earning before Investments & tax (million €)	-41.9	-327%	0.9	6%	-2.6	-12%	-381%
Net Profit (million €)	-42.2	-329%	0.8	5%	-2.8	-13%	-472%
Volume of sales (thousand tonnes)	19.0		20.8		28.1		35%
Other freshwater fish on growing							
Total Income (million €)	3.4	100%	6.0	100%	7.2	100%	20%
Gross Value Added (million €)	0.5	16%	1.5	25%	1.5	20%	-3%
Operating Cash Flow (million €)	-2.5	-74%	0.6	10%	0.5	7%	-19%
Earning before Investments & tax (million €)	-2.6	-75%	0.3	5%	0.3	4%	8%
Net Profit (million €)	-2.6	-77%	0.2	4%	0.0	1%	-78%
Volume of sales (thousand tonnes)	0.3		0.5		1.9		265%
Other marine fish on growing							
Total Income (million €)	0.2	100%	0.2	100%	0.4	100%	123%
Gross Value Added (million €)	0.1	37%	0.1	50%	0.1	24%	7%
Operating Cash Flow (million €)	-0.1	-60%	0.0	6%	0.0	-4%	-239%
Earning before Investments & tax (million €)	-0.1	-63%	0.0	2%	0.0	-7%	-1116%
Net Profit (million €)	-0.1	-64%	0.0	0%	0.0	-8%	-7846%
Volume of sales (thousand tonnes)	0.0		0.1		0.0		-73%

Sea bass & Sea bream cages							
Total Income (million €)	1.2	100%	2.6	100%	16.6	100%	535%
Gross Value Added (million €)	0.2	19%	0.3	13%	3.3	20%	889%
Operating Cash Flow (million €)	0.1	6%	-0.4	-17%	1.3	8%	-393%
Earning before Investments & tax (million €)	0.0	-2%	-0.9	-33%	0.1	1%	-111%
Net Profit (million €)	-0.1	-4%	-0.9	-35%	-0.8	-5%	-13%
Volume of sales (thousand tonnes)	0.3		0.4		2.5		586%
Sea bass & Sea bream combined							
Total Income (million €)	1.8	100%	17.1	100%			
Gross Value Added (million €)	0.5	28%	4.4	26%			
Operating Cash Flow (million €)	0.0	0%	2.9	17%			
Earning before Investments & tax (million €)	0.0	-3%	1.8	11%			
Net Profit (million €)	0.0	-3%	1.1	7%			
Volume of sales (thousand tonnes)	0.2		2.5		0.2		-91%
Sea bass & Sea bream on growing							
Total Income (million €)	7.4	100%	0.5	100%	1.2	100%	144%
Gross Value Added (million €)	1.9	25%	0.1	14%	0.5	39%	594%
Operating Cash Flow (million €)	0.5	6%	-0.3	-54%	0.2	21%	-193%
Earning before Investments & tax (million €)	0.1	2%	-0.3	-67%	0.2	19%	-168%
Net Profit (million €)	0.0	0%	-0.3	-68%	0.2	18%	-163%
Volume of sales (thousand tonnes)	0.8		0.1		0.2		156%
Trout combined							
Total Income (million €)	9.6	100%	8.6	100%	75.2	100%	772%
Gross Value Added (million €)	2.7	28%	3.2	37%	63.0	84%	1890%
Operating Cash Flow (million €)	1.6	16%	2.0	23%	53.1	71%	2554%
Earning before Investments & tax (million €)	1.5	15%	1.7	20%	49.1	65%	2806%
Net Profit (million €)	0.2	2%	1.6	18%	47.9	64%	2907%
Volume of sales (thousand tonnes)	4.3		2.1		17.7		728%
Trout on growing							
Total Income (million €)	3.0	100%	2.3	100%	4.3	100%	83%
Gross Value Added (million €)	1.0	35%	0.5	20%	1.3	30%	169%
Operating Cash Flow (million €)	0.4	14%	0.2	10%	0.7	16%	194%
Earning before Investments & tax (million €)	0.4	14%	0.1	6%	0.2	4%	24%
Net Profit (million €)	0.4	12%	0.0	2%	-0.4	-8%	-1019%
Volume of sales (thousand tonnes)	1.5		0.2		0.9		361%

Figure 5.14.2 Economic performance indicators per segments for Italy: 2010.

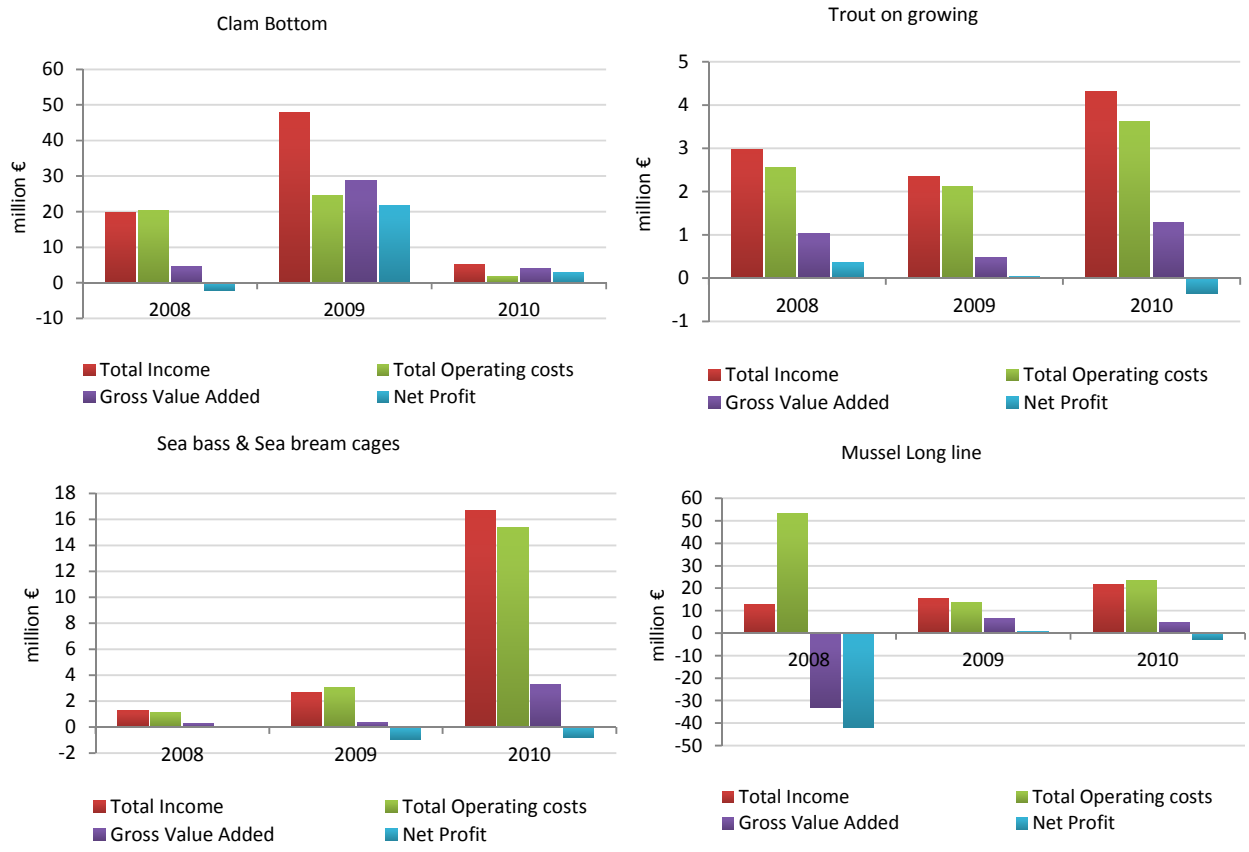
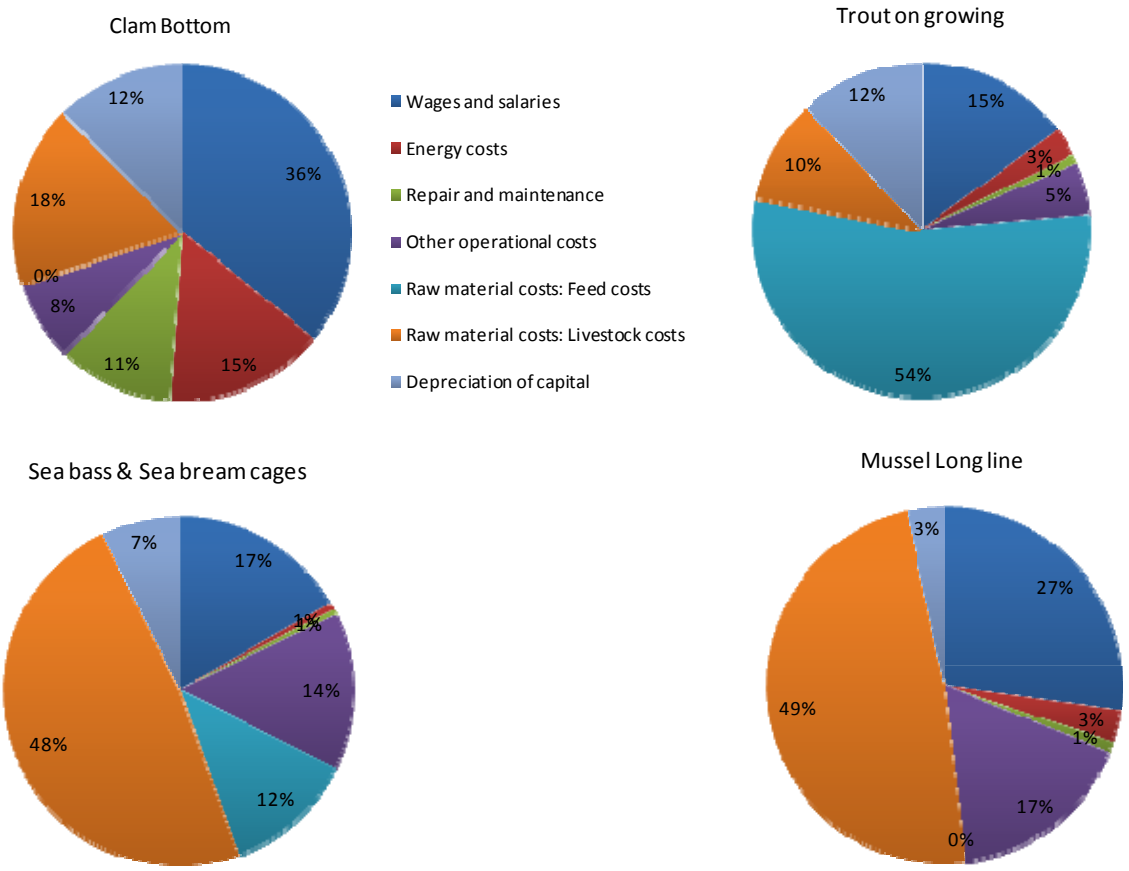


Figure 5.14.3 Cost structure of main segments for Italy: 2010



5.14.3 Data coverage and Data Quality

Italian aquaculture data submitted in the DCF data call refers to the sample they obtained from the survey, and not to the entire population. Data raised to the entire population have not been submitted at the time of the finalisation of this report. Therefore, this sample data reported under the DCF is presented in the tables and figures of this Italian national chapter, but they are not used on the EU overview.

5.15 LATVIA

5.15.1 Overview of the sector

The Latvian aquaculture sector produced 549 tonnes in 2010. This production was valued 1.05 million Euros (FAO, 2012). The sector is represented mostly by carp ponds. Latvia produces no marine aquaculture (FAO, 2012), and therefore did not submit aquaculture data under the DCF regulation.

Table 5.15.1 Production weight and value of the Latvian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	0.6	0.5	0.5
production value (thousand €)	1.5	1.1	1.1

(source: FAO, 2012)

Common carp was the main species produced in Latvia in 2010, representing 67 % of the value and 80 % of the weight of the total Latvian aquaculture production. Other important fish species are sturgeon, catfish, trout and northern pike.

Table 5.15.2 Top 5 species by aquaculture production weight and value in Latvia: 2010.

	production volume (tonnes)
Species	
Common carp	439.1
Wels (=Som) catfish	26.9
Northern pike	17.6
Goldfish	17.1
Trouts nei	11.3

	production value (thousand €)
Species	
Common carp	701
Sturgeons nei	79
Wels (=Som) catfish	65
Trouts nei	56
Northern pike	46

(source: FAO, 2012)

5.16 LITHUANIA

5.16.1 Overview of the sector

Lithuanian aquaculture sector produced 3.2 thousand tonnes in 2010. This production was valued about 6.3 million Euros (FAO, 2012). The sector is mostly represented by carp ponds. Lithuania produces no marine aquaculture (FAO, 2012), and therefore did not submit aquaculture data under the DCF regulation.

Table 5.16.1 Production weight and value of Lithuanian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	3.0	3.4	3.2
production value (thousand €)	6.6	6.6	6.3

(source: FAO, 2012)

The total employment in the aquaculture sector was 348 employees, mostly men, representing about 82 % of total number of employees[1]. The common carp was the main specie produced by Lithuanian aquaculture sector, representing 86 % of value and 92 % of value of total production in 2010. Other important fish species are: Northern pike, trouts and sturgeons.

Table 5.16.2 Top 5 species by aquaculture production weight and value in the Lithuania: 2010.

	production volume (tonnes)
Species	
Common carp	2936
Northern pike	106
Trouts nei	34
Goldfish	33
Bighead carp	30

	production value (thousand €)
Species	
Common carp	5407
Freshwater fishes nei	285
Northern pike	212
Trouts nei	109
Sturgeons	98

(source: FAO, 2012)

[1] Data source: Agriinformation and Rural Business Center.

5.17 LUXEMBOURG

Luxembourg has no aquaculture production.

5.18 MALTA

5.18.1 Overview of the sector

The Maltese aquaculture sector produced 5.4 thousand tonnes valued in 54.3 million Euros in 2010. This implies a decrease in 14 % from 2009 in weight, but a 13 % increase in value.

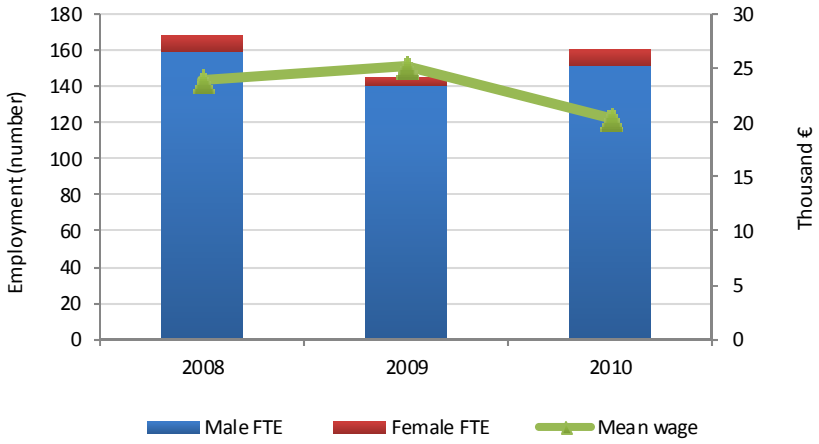
Table 5.18.1 Sector overview for Malta: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*6*	*6*	*6*	*0%*
<= 5 employess	0	0	0	
6-10 employess	1	1	0	-100%
> 10 employees	5	5	6	20%
Employment (number)				
Total employees	*221*	*173*	*227*	*31%*
Male employees	210	167	205	23%
Female employees	11	6	22	267%
FTE	*169*	*145*	*161*	*11%*
Male FTE	160	141	152	8%
Female FTE	9	4	9	125%
Input & Production (thousand tonnes)				
Raw material volume: Feed	24.8	36.6	18.0	-51%
Raw material volume: Livestock			1.2	
Production volume	6.7	6.3	5.4	-14%
Indicators				
FTE per enterprices	28.2	24.2	26.8	11%
Average wage (thousand €)	24.0	25.2	20.4	-19%
Labour productivity (thousand €)	150.6	-149.9	91.7	161%

The number of aquaculture companies in Malta during 2008-2010 was stable and amounted to 6 companies. All enterprises employed more than 10 employees in 2010. In total, companies employed 227 employees, of which 205 were male in 2010. The number of total full-time equivalent amounted to 161 of which 152 were male full-time equivalents. Comparing to 2010 the number of employees as well as full time employment has increased by 31 % and 11 % respectively. However the average wage decreased by 19 % while the labour productivity increased by 161 % in 2010.

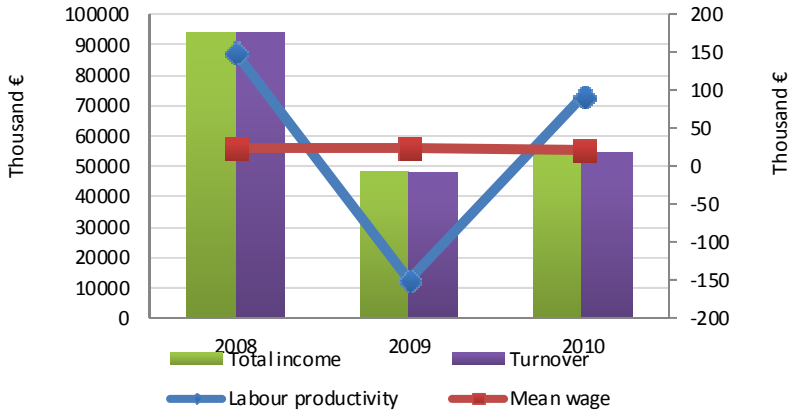
The employment trend analysis is showing the decrease of employment in 2009, which might be driven by economic crisis and decrease of turnover of the sector by almost half in the same year.

Figure 5.18.1 Malta employment trends: 2008-2010.



The labour productivity improved in 2010 as the sector moved from loss making to profit making position (See figure below).

Figure 5.18.2 Maltese income, wage and labour productivity trends: 2008-2010.



Economic performance of Maltese aquaculture sector is showing improvement in almost all performance indicators (see table below) in 2010. The situation changed as the sector managed to reduce total operating costs by 42 % in 2010. This change was mostly driven by the reduction of raw material costs, which in total accounted around 60-66 % of total operating costs in 2008-2010 and followed reduction of production (by 15 % in 2010).

Table 5.18.2 Economic performance for Malta: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	93.6	100%	47.9	99%	54.3	100%	13%
Other income	0.0	0%	0.2	0%	0.2	0%	-6%
Subsidies	0.1	0%	0.1	0%	0.0	0%	-100%
Total income	*93.7*	*100%*	*48.2*	*100%*	*54.5*	*100%*	*13%*
Expenditure (million €)							
Wages and salaries	4.1	4%	3.7	8%	3.3	6%	-10%
Imputed value of unpaid labour	0.0	0%	0.0	0%	0.0	0%	
Energy costs	2.8	3%	1.5	3%	0.9	2%	-41%
Repair and maintenance	4.5	5%	4.1	8%	0.9	2%	-78%
Raw material costs: Feed costs	17.5	19%	22.4	46%	13.0	24%	-42%
Raw material costs: Livestock costs	25.3	27%	26.2	54%	13.7	25%	-48%
Other operational costs	18.0	19%	15.7	33%	11.2	21%	-29%
Total operating costs	*72.2*	*77%*	*73.5*	*152%*	*43.0*	*79%*	*-42%*
Capital Costs (million €)							
Depreciation of capital	8.8	9%	11.1	23%	6.3	12%	-43%
Financial costs, net	1.1	1%	7.2	15%	1.1	2%	-85%
Extraordinary costs, net	3.3	4%	5.3	11%	0.2	0%	-95%
Capital value (million €)							
Total value of assets	18.7	20%	17.5	36%	13.7	25%	-22%
Net Investments	4.1	4%	0.9	2%	1.5	3%	68%
Debt	5.3	6%	37.3	77%	29.3	54%	-21%
Performance Indicators (million €)							
Gross Value Added	25.4	27%	-21.7	-45%	14.8	27%	168%
Operating Cash Flow	21.5	23%	-25.3	-52%	11.5	21%	145%
Earning before Interest and Tax	12.7	14%	-36.4	-75%	5.1	9%	114%
Net Profit	11.6	12%	-43.6	-90%	4.0	7%	109%
Capital Productivity	135.9		-124.0		107.7		
Return on Investments (%)	67.7		-207.6		37.5		
Financial position (%)	71.7		-112.6		-113.4		
Future Expectation Indicator (%)	-25.0		-58.2		-35.6		

Despite the 13 % increase in turnover and overall increase in the economic performance, the 2008 levels have not been recovered after the 2009 drop. The 2009 fall in the Maltese aquaculture economic performance was due to the decrease in the bluefin tuna prices as a result of an over-supply and reduced demand from Asian markets.

5.18.2 Structure and economic performance of the sector's main segments

Maltese aquaculture sector is represented by tuna and sea bass & sea bream farming, however due to confidentiality reasons, segments analysis is not possible.

5.18.3 Trends and triggers

Considering that the main activity of Maltese aquaculture sector is tuna fattening (amounting more than 90 % of total turnover) and the decrease of feed use in 2010 by 51 %, the decrease of production volume might be expected in the coming years.

5.18.4 Data coverage and Data Quality

Data cannot be reported by segments because of confidentiality reasons.

5.19 NETHERLANDS

5.19.1 Overview of the sector

The aquaculture sector in the Netherlands (for consumption fish) is small compared to the fisheries sector. Total production value of the Dutch aquaculture sector in 2009 was 77.8 million Euro. The total aquaculture sector, including freshwater fish culture, consisted of about 136 companies and employed around 170 FTE. The majority of the companies are located in the South-west part and are involved in the culture of shellfish. Some freshwater fish culture occurs spread out over the rest of the Netherlands.

Table 5.19.1 Sector overview for Netherlands: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises		*136*		
<= 5 employess		136		
6-10 employess		0		
> 10 employees		0		
Employment (number)				
Total employees	*170*	*170*		
Male employees	0	0		
Female employees	0	0		
FTE	*0*	*0*		
Male FTE	0	0		
Female FTE	0	0		
Input & Production (thousand tonne)				
Raw material volume: Feed	0.0	0.0		
Raw material volume: Livestock	0.0	0.0		
Production volume	37.0	46.0		
Indicators				
FTE per enterprices				
Average wage (thousand €)	51.5	54.0		
Labour productivity (thousand €)	339.3	238.7		

The economic results of the whole aquaculture sector in the Netherlands depend primarily on the developments in the mussel sector, which is by far the most important within Dutch aquaculture. This segment is the most profitable part of the primary seafood industry in the Netherlands with a positive Gross Added Value and considerable returns on investments. Due to a decrease in the price of mussels the turnover of the sector

decreased substantially in 2009. This also caused decreases in all other economic indicators. Wages increased slightly, but the increase was only limited.

Figure 5.19.1 Netherlands employment trends: 2008-2010.

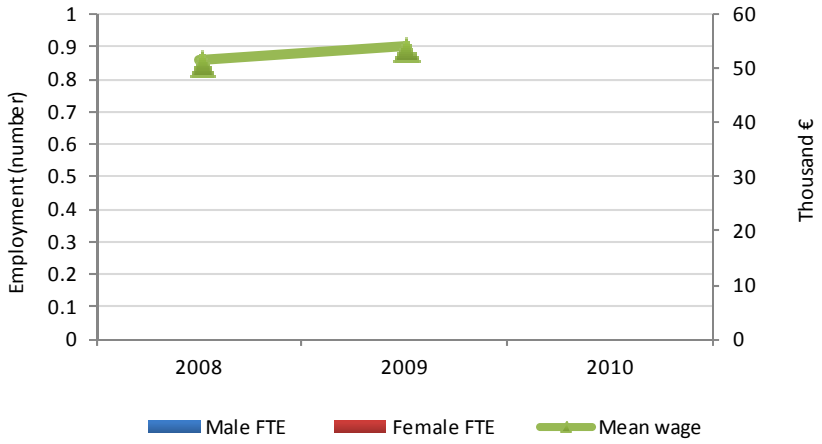


Figure 5.19.2 Netherlands income, wages and labour productivity trends: 2008-2010.

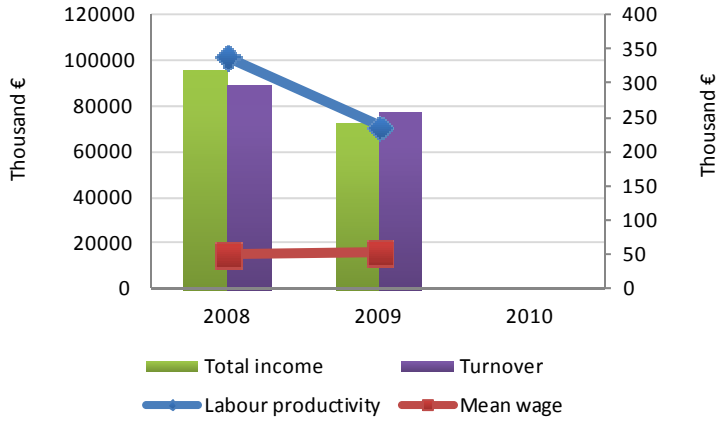


Table 5.19.2 Economic performance for Netherlands: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	90.2	93%	77.8	106%			
Other income	9.1	9%	-2.4	-3%			
Subsidies	0.0	0%	0.0	0%			
Total income	*96.8*	*100%*	*73.1*	*100%*			
Expenditure (million €)							
Wages and salaries	8.8	9%	9.2	13%			
Imputed value of unpaid labour	0.0	0%	0.0	0%			
Energy costs	6.9	7%	6.4	9%			
Repair and maintenance	5.2	5%	4.7	6%			
Raw material costs: Feed costs	8.9	9%	7.3	10%			
Raw material costs: Livestock costs	11.2	12%	6.6	9%			
Other operational costs	9.4	10%	9.7	13%			
Total operating costs	*50.4*	*52%*	*44.0*	*60%*			
Capital Costs (million €)							
Depreciation of capital	6.2	6%	8.8	12%			
Financial costs, net	8.5	9%	17.8	24%			
Extraordinary costs, net	1.1	1%	3.0	4%			
Capital value (million €)							
Total value of assets	222.3	230%	195.3	267%			
Net Investments	8.3	9%	11.4	16%			
Debt	139.7	144%	121.0	165%			
Performance Indicators (million €)							
Gross Value Added	57.7	60%	40.6	55%			
Operating Cash Flow	46.5	48%	29.1	40%			
Earning before Interest and Tax	40.3	42%	20.3	28%			
Net Profit	31.8	33%	2.5	3%			
Capital Productivity	26.0		20.8				
Return on Investments (%)	18.1		10.4				
Financial position (%)	37.1		38.0				
Future Expectation Indicator (%)	1.0		1.3				

5.19.2 Structure and economic performance of the sector's main segments

The Dutch aquaculture sector consists of three main segments:

- Mussel culture: Concentrated in Zeeland and the Wadden area this is the biggest sector within Dutch aquaculture. Around 50 companies are actively involved, producing around 50 million kg of mussels annually during the last years. However, the production of mussels (in tonnes) has declined quite a lot since 1996. In 1996 92,000 tons of mussels were produced. In 2009 the production was only 46,000 tons, a decline of almost 50 %. One of the reasons is a shortage of spat due to environmental restrictions on the catch of wild spat and a natural shortage of spat in the areas where catches are still allowed. The mussels are grown predominantly in bottom culture.

- The culture of Flat oysters and Pacific oysters is closely connected to mussel culture. About half of the 26 companies that produce oysters also produce mussels Oysters are also grown in bottom culture. The production of oysters has recently declined considerably from between 25 - 30 million pieces per year between 2004 and 2008 to 20 million pieces in 2009.

- Beside these two sectors, aquaculture of a variety of freshwater species is also taking place in the Netherlands, with European eel, and catfish (North African catfish and Claresse) being the two most important species. For different reasons the number of companies and the production of both species declined steeply over the last decade. Other species which are grown by a small number of companies are trout, tilapia, carp, pikeperch, sole and turbot. Most of the Dutch fish farms are just producing one species, although at least one firm produced both European eel and North African catfish.

As said before, mussel culture is the most profitable segment in the Dutch fish industry. The return on investment is not extremely high, but this is also due to the substantial invested capital in this sector. Labour productivity is very high in this industrialised culture. Most important costs items include financial costs (34 %), wages (16 %) and depreciation costs (13 %). Energy costs, repair and maintenance and the costs of spat are of lesser importance. Within other operational costs, rental costs for the area where the mussels are important.

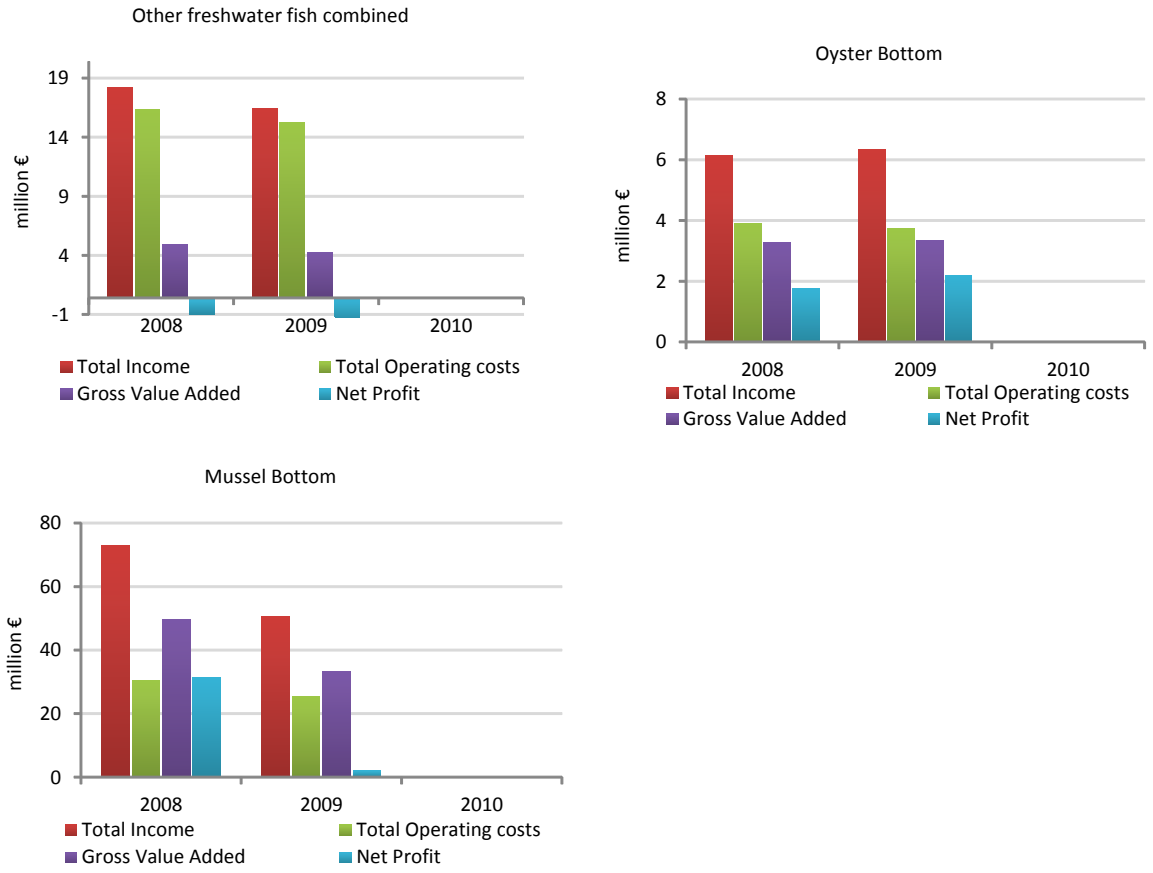
The Oyster industry is quite different from the mussel industry. The scale of production is lower, companies are smaller and a large part of the companies combines the culture of oysters with other activities. The capital invested in the vessels is much lower (average age around 70 years) than for the mussel sector, resulting in a higher return on investment and capital productivity, but labour productivity is much lower than in the mussel sector. Over the last years this sector has shown big variations in income due to large changes in production and prices, but in 2009 the economic revenues were in general positive. Most important costs items for the oyster sector are wages and repair and maintenance (both around 20 %). Other operational costs include also for this sector the costs of lease of the growing area (approx. 8 %). Depreciation costs and energy costs are of secondary importance (around 10 %).

Fresh water aqua culture is a relatively small sector in the Netherlands. By far the most important cost is feedstock (40 %), followed at a distance by livestock costs (20 %) and energy costs (15 %). Data presented here shows that the sector as a whole does not make profit. Behind the averages on economic performance presented here, there is much variation between companies. While some of them make profits and manage to increase production capacity, others make losses.

Table 5.19.3 Economic performance for Netherlands at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Mussel Bottom							
Total Income (million €)	72.9	100%	50.8	100%			
Gross Value Added (million €)	49.8	68%	33.3	66%			
Operating Cash Flow (million €)	42.4	58%	25.3	50%			
Earning before Investments & tax (million €)	38.8	53%	18.9	37%			
Net Profit (million €)	31.4	43%	2.4	5%			
Volume of sales (thousand tonnes)							
Other freshwater fish combined							
Total Income (million €)	17.8	100%	16.0	100%			
Gross Value Added (million €)	4.6	26%	3.9	25%			
Operating Cash Flow (million €)	1.8	10%	1.2	7%			
Earning before Investments & tax (million €)	-0.3	-2%	-0.9	-5%			
Net Profit (million €)	-1.4	-8%	-2.1	-13%			
Volume of sales (thousand tonnes)							
Oyster Bottom							
Total Income (million €)	6.2	100%	6.3	100%			
Gross Value Added (million €)	3.3	54%	3.4	53%			
Operating Cash Flow (million €)	2.2	36%	2.6	41%			
Earning before Investments & tax (million €)	1.8	30%	2.2	35%			
Net Profit (million €)	1.8	29%	2.2	35%			
Volume of sales (thousand tonnes)							

Figure 5.19.3 Economic performance indicators per segments for Netherlands: 2010.



5.19.3 Trends and triggers

As from 2009 the mussel sector has started the execution of a covenant with the Ministry of Agriculture, Nature Conservation and Food Security and nature organisations to gradually abolish the fishery for spat and replace it by mussel seed capture installations. Over the last years a number of experimental setups have been tested for inshore installations and some of the systems are now scaled up. Higher production of spat is required for an increase in total mussel production. General belief in the sector is that there is market demand for more mussels.

Also in the oyster sector experiments with spat capture installations have been carried out.

In land-based aquaculture the main innovation of the last years has been experiments with integrated sole production along with ragworm, shellfish and sea crops in open channels in the south west of the Netherlands.

5.19.4 Data coverage and Data Quality

In contrary to the fisheries sector, the aquaculture sector is relatively data poor. Only for the mussel culture, reliable data exist on the total production from the mussel auction in Yerseke. For other sectors the data collection solely depends on data collection from firms. In order to attain economic information from the aquaculture sector LEI makes use of a panel of companies from which the annual financial accounts are analysed. This is mainly because of high non-response of previous questionnaires in this sector. Moreover, this way of data collection ensures the proper quality of the data. For the mussel and oyster sector there are no confidentiality issues.

The results presented in this chapter concern the years 2008 and 2009. 2010 data was not submitted. Concerning 2009, more accurate data is presented than last year as more panel data was available. Also, we added information on the economic performance of fish aquaculture.

5.20 POLAND

5.20.1 Overview of the sector

Aquaculture in Poland consists only of land-based freshwater farms. According to the data submitted by Poland to FAO the total weight of aquaculture production for human consumption was 30.8 thousand tonnes in 2010, a decrease of 16 % compared to the previous year. The turnover amounted to 67.5 million Euros, decreasing also by 12 %.

The biggest sector is the production of carps. In 2010, carps stand for 49 % of the whole aquaculture turnover and for 50 % of the production weight. Carp farms are widespread all over the country but the largest facilities are located in central and southern Poland where climatic conditions are warmer and thus more advantageous. Carp production is carried out in the traditional land-based farms in earth ponds. In 2010, according to the Central Office of Cartography and Geodesy, the surface area of earth ponds was 72.5 thousand hectares on which production was conducted on more than 55 thousand hectares.

The next species is trout, which contributed for 42 % to both turnover and production weight. Trout farms are located in the north on the Baltic Sea coast and in southern Poland in the Carpathian foothills in rich terrain with clear, cool waters. Trout production is carried out in intensive fish production facilities. Most of aquaculture farms produce more than one species, mainly African catfish, grass carp, silver carp, bighead carp, crucian carp, pike, European catfish, tench and sturgeon. In 2010 other species constituted 9 % of turnover in aquaculture and have 8 % share in volume of production.

In addition to the production of fish for the food market, the sector produces juveniles of many species for restocking in open waters. Total value of restocking material of all species of fish introduced into lakes, rivers and reservoirs amounted to 11.4 million Euros in 2010. In this, the value of restocking material released as part of the program "Restocking Polish Marine Areas in 2010" amounted to more than 1 million Euros (9 %). Restocking Polish Marine Areas with salmon, sea trout, whitefish, vimba and Atlantic sturgeon is funded by the State and managed by the Panel for Restocking appointed by the Minister of Agriculture and Rural Development (MARD).

In 2010 there were about 1,000 aquaculture land-based farms in Poland. A legal form called “natural person” was dominating (76 % of all aquaculture entities), next were legal persons (22 %) and “other” (2 %). That means that the aquaculture farms were managed mainly by small family enterprises or small to medium companies. The number of people employed in them was estimated to be 5,500.

In accordance with the provisions of Chapter IV, Part A, point of 2.2. Commission decision of the 6th of November 2008 (2008/949/WE) collecting economic data for freshwater species is not mandatory. For this reason the economic performance includes only information on fish farms that breed and rear Atlantic salmon fry and cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development to stocking Polish Marine Areas. In 2009-2010, there were 5 of these land-based farms. All of them apply combined fish farming techniques. Employment in three companies exceeded 10 people, and in two were less than 5 employees.

Total production of the 5 analyzed fish farms was about 1.2 thousand tonnes of fish, an increase of 9 % compared to the previous year. The share of salmon fries and smolts in the total volume of production was 1.3 %. FTE was 50 persons, mainly men (80 %); compared to the previous year FTE decreased by 6 %.

Table 5.20.1 Sector overview for Poland: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises		*5*	*5*	*0%*
<= 5 employess		2	2	0%
6-10 employess		0	0	
> 10 employees		3	3	0%
Employment (number)				
Total employees		*58*	*58*	*0%*
Male employees		46	47	2%
Female employees		12	11	-8%
FTE		*53*	*50*	*-6%*
Male FTE		43	41	-5%
Female FTE		10	9	-10%
Input & Production (thousand tonnes)				
Raw material volume: Feed		1.3	1.3	2%
Raw material volume: Livestock		0.1	0.2	24%
Production volume		1.1	1.2	9%
Indicators				
FTE per enterprices		10.6	10.0	-6%
Average wage (thousand €)		10.1	11.7	16%
Labour productivity (thousand €)		19.0	26.7	41%

Annual average wages, including imputed value of unpaid labour, was 11,714 Euros a 16 % increase compared to the previous year. Also labour productivity increased by 41 % and shows that farms manage their human resources more effectively.

Figure 5.20.1 Poland employment trends: 2008-2010.

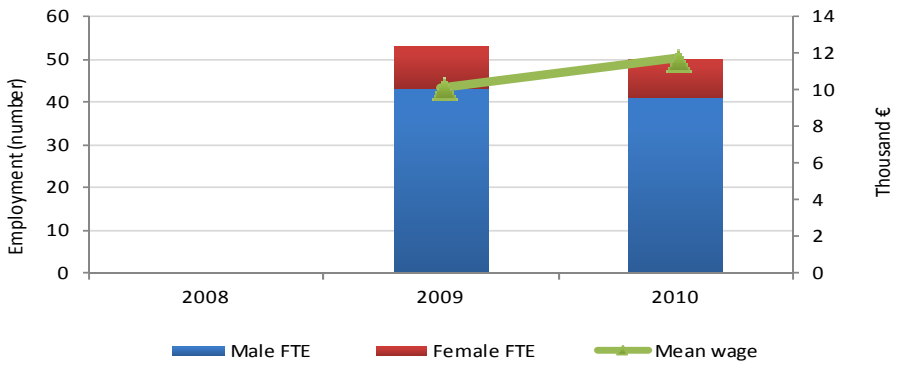
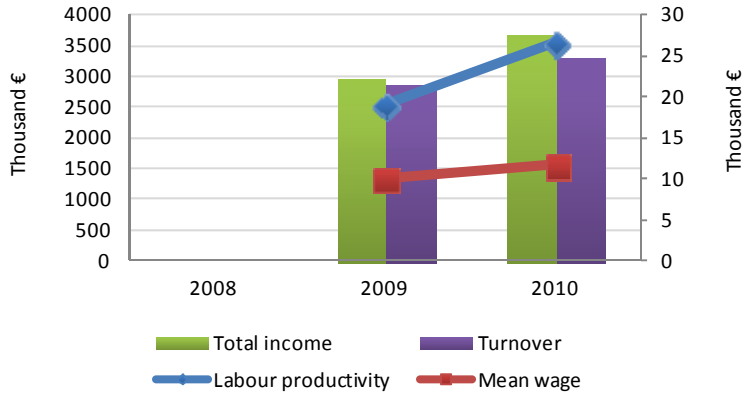


Figure 5.20.2 Polish income, wages and labour productivity trends: 2008-2010.



The turnover amounted to 3.32 million Euros, a 15 % increase. The share of Atlantic salmon fry in turnover was only 9.5 %.

Ratio analysis shows that the economic performance of analyzed farms was good and improved compared to the previous year. The contribution to the national economy, measured with GVA indicator, was 1.3 million Euros and increased by 33 %. The operating profit before taxes and interest (EBIT) amounted to 0.84 million Euros, increasing by 163 %. Net profit also increased to 0.76 million Euros (197 %). The capital productivity increased to 16.1 % and the productivity of business assets, independent of the taxes and interest (ROI) increased to 10.2 thousand Euros and shows that farms manage their assets effectively. Also the future expectation improved to 1.7 %. Only the financial position of farms worsened due to an increase on the debts.

The cost structure (Table 4.20.2) has not changed in comparison to the previous year. More than half of the cost of production (59 %) was the purchase of raw materials. Livestock costs had the largest share (43 %) while the feed share was only 16 %. Labour costs (wages and salaries and imputed value of unpaid labour) had the 21 % share of total costs. Share of other elements of the cost was lower and range from 8 % to 3 %, respectively for depreciation and other operational costs.

Table 5.20.2 Economic performance for Poland: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover			2.9	97%	3.3	90%	15%
Other income			0.0	1%	0.0	1%	51%
Subsidies			0.1	2%	0.3	9%	527%
Total income			*3.0*	*100%*	*3.7*	*100%*	*25%*
Expenditure (million €)							
Wages and salaries			0.5	16%	0.5	13%	5%
Imputed value of unpaid labour			0.1	2%	0.1	2%	38%
Energy costs			0.1	4%	0.1	3%	-6%
Repair and maintenance			0.1	4%	0.1	4%	34%
Raw material costs: Feed costs			1.2	39%	1.2	33%	7%
Raw material costs: Livestock costs			0.3	11%	0.5	13%	39%
Other operational costs			0.2	7%	0.1	2%	-59%
Total operating costs			*2.4*	*82%*	*2.6*	*71%*	*7%*
Capital Costs (million €)							
Depreciation of capital			0.2	7%	0.2	7%	19%
Financial costs, net			0.1	2%	0.1	2%	32%
Extraordinary costs, net			0.0	0%	0.0	1%	
Capital value (million €)							
Total value of assets			7.6	256%	8.3	224%	9%
Net Investments			0.1	5%	0.4	10%	178%
Debt			1.2	41%	3.9	104%	221%
Performance Indicators (million €)							
Gross Value Added			1.0	34%	1.3	36%	33%
Operating Cash Flow			0.5	18%	1.1	29%	107%
Earning before Interest and Tax			0.3	11%	0.8	23%	163%
Net Profit			0.3	9%	0.8	20%	197%
Capital Productivity			13.3		16.1		
Return on Investments (%)			4.2		10.2		
Financial position (%)			84.1		53.5		
Future Expectation Indicator (%)			-0.9		1.7		

5.20.2 Trends and triggers

Restocking of the Polish maritime areas is carried out under the Fisheries Act of 19 February 2004 (Journal of Laws of 2004, No. 62, pos. 574) by the Minister of Agriculture and Rural Development and it is funded annually by the state budget. The statutory guarantee for the restocking creates good prospects for fish farms that produce Atlantic salmon juveniles for the purpose of restocking Polish marine waters.

Carps are produced for the domestic market. Export opportunities are just over a hundred tonnes per year. Most carps are sold in December before Christmas Eve in the form of live fish and fresh whole fish. The decrease in production in 2010 resulted in an increase in imports of carps to 3.1 thousand tonnes, representing an increase of 232 % compared to the previous year.

The main factor which stimulates the production of rainbow trout, in addition to domestic demand, is exports, which in 2008-2010 stand for 4.4 thousand tonnes (34 % of total production in 2010). More than 90 % of the trout exports go to the German market.

As a result of decreasing production, trout imports increase each year, reaching 6.1 thousand tonnes in 2010, a 20 % increase compared to the previous year and a 86 % compared to 2008. The largest trout exporters to the Polish market are Turkey and Spain (48 % and 15 %, respectively, in 2010).

The production of the additional fish species is driven by the need to diversify production to reduce the sales problems, especially carp ones. In 2010, Poland imported 34.3 thousand tonnes of other freshwater fish. Among them, mostly pangasius (62 %), tilapia (20 %), and other freshwater fish (18 %). 96 % of the imports were freshwater fish fillets.

To increase sales fish farmers more often process their products by themselves and offer fresh fillets or smoked fish.

Some Polish extensive fish ponds, due to the biological diversity of habitat and animal species of special importance for Poland, were included in the Natura 2000 areas. In this case, many farms are turned into multifunctional pond fish farms, which also offer recreation services, maintaining biodiversity and improving water management.

The investments in aquaculture are supported by grants under the Operational Programme "Sustainable Development of the Fisheries Sector and Coastal Fishing Areas 2007-2013". Under Priority Axis 2 -" Aquaculture, inland fishing, processing and marketing of fishery and aquaculture products" the limit of funds for support investments in aquaculture (measure 2.1) is 50.2 million Euros and the limit of measure 2.2 "Aqua-environmental measures" is 37.1 million Euros.

Since the beginning of the Programme to the end of 2010 the amount of signed contracts for the co-financing of investments in measure 2.1 accounted for almost 80 % of the available limit and in measure 2.2 accounted for 97% of the available limit. The majority of operations implemented under measure 2.1 consists in development and modernisation of the aquaculture production facilities, investment in aquaculture diversification towards prospective or new species and in development of sustainable aquaculture. Within the measure 2.2 Aqua-environmental measures there are two kinds of actions to be carried out: 1.supporting the use of traditional or environmentally friendly practices and techniques in breeding and farming fish; 2. protecting fish genetic resources. Fish farms located in Natura 2000 areas can get financial assistance under the action 2.2.

There is a new trend in Polish aquaculture: implementation of certification for product safety and organic production. So far only the barramundi farming near Olsztyn has implemented GLOBAL GAP.

In Poland freshwater fish production is dependent on the prevailing meteorological conditions. In the case of carp too low autumn temperature shortens the feeding period and growth of fish. However, in the case of trout too high temperature continuing in the period from June to August limits feeding and weight gains of fish. Increased fish mortality is also a result of poor epizootic situation in farmed fish and increased pressure of fish-eating animals (cormorants and otters), which are covered by the protection. In 2011, there was a further decline in fish production in freshwater aquaculture because of adverse weather conditions, the growing problems of health-fish and water quality, and local flooding. Too low water temperature, especially in autumn, shortened the period of carp feeding. Whereas very high temperature keeping up to mid-June to mid-August a reduced the period of trout feeding and their weight gains.

In 2011 the construction of the largest and most modern fish farm in Poland in a closed circuit water system has started in the village of Boński near Płońsk. The target production is expected to reach 1.3 thousand tonnes, mainly including thermophilic species, such as tilapia.

5.20.3 Data coverage and Data Quality

Poland is not obliged to collect the freshwater aquaculture economic data in accordance with the provisions of Chapter IV, Part A, point of 2.2. Commission decision of 6 November 2008 (2008/949/WE). The overview of the sector was based on the data submitted by Poland to FAO and the expert knowledge.

The economic performance includes only fish farms that breed and rear Atlantic salmon juveniles and cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development (MARD) to restocking Polish marine areas and the maintenance and conservation of diadromous fishes in the surface inland waters. In 2010, there were five such farms.

A questionnaire was used to collecting all data. In 2010 all completed questionnaires returned.

5.21 PORTUGAL

5.21.1 Overview of the sector

Portugal has favourable natural conditions to the development of aquaculture production. In 2010 there were 1,467 active establishments in aquaculture, 94 % of them were bottom culture, 4 % were ponds and tanks and 2 % were floating structures. The aquaculture companies are mostly small familiar units, under extensive exploitation and producing bivalve molluscs. Regarding the production of finfish, semi-intensive and intensive farms are dominant. The Portuguese aquaculture sector employs directly about 2,319 persons, of which 1,889 are male and 430 female.

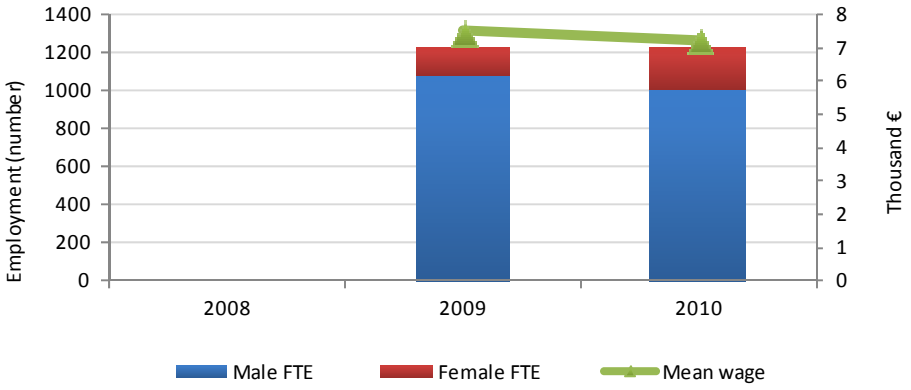
In 2010, the total sales volume amount to 6,508 tonnes with a total income of 42 million Euros. The total sales volume in marine and brackish waters remains the most important, accounting for about 90 % of the total volume of sales. In Portugal the clams culture bottom remains with the higher value.

The number of freshwater establishments remained constant, and consequently the total sales volume has not had big changes over the recent years.

Table 5.21.1 Sector overview for Portugal: 2008-2010.

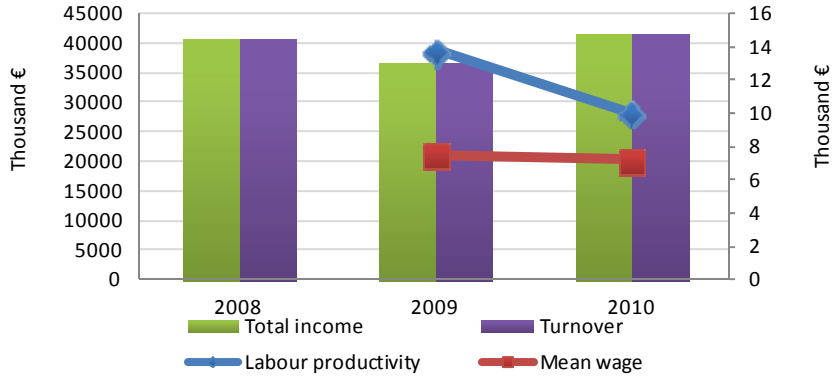
	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*1463*	*1454*	*1459*	*0%*
<= 5 employess	1446	1443	1443	0%
6-10 employess	11	7	9	29%
> 10 employees	6	4	7	75%
Employment (number)				
Total employees	*2347*	*2306*	*2320*	*1%*
Male employees		2024	1889	-7%
Female employees		282	430	52%
FTE		*1227*	*1228*	*0%*
Male FTE		1085	1004	-7%
Female FTE		142	224	57%
Input & Production (thousand tonnes)				
Raw material volume: Feed	8.2	7.6	7.3	-4%
Raw material volume: Livestock	0.1	0.1	0.5	217%
Production volume	6.9	6.2	6.5	5%
Indicators				
FTE per enterprices		0.8	0.8	0%
Average wage (thousand €)		7.5	7.2	-4%
Labour productivity (thousand €)		13.8	10.0	-28%

Figure 5.21.1 Portugal employment trends: 2008-2010.



From previous figure it can be seen that while the employment (measured in FTE terms) has remained stable, the average salary has decreased by 4 %. There is the need to look at the potential factors for this decrease (i.e. economic crisis, an increase in the women share).

Figure 5.21.2 Portuguese income, wages and labour productivity trends: 2008-2010.



In 2010, the income has increased by 12 % in comparison to 2009. The labour productivity, which describes the value added to the economy from the activity in this case the value added to the economy by one FTE, has declined. This is because for 2010 for the other operating costs have duplicated, and so economic performance has decreased.

Table 5.21.2 Economic performance for Portugal: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	41.0	100%	37.2	100%	41.7	100%	12%
Other income	0.0	0%	0.0	0%	0.0	0%	
Subsidies	0.0	0%	0.0	0%	0.0	0%	
Total income	*41.0*	*100%*	*37.2*	*100%*	*41.7*	*100%*	*12%*
Expenditure (million €)							
Wages and salaries			7.0	19%	7.1	17%	1%
Imputed value of unpaid labour			2.2	6%	1.8	4%	-18%
Energy costs	2.0	5%	3.4	9%	2.2	5%	-36%
Repair and maintenance			3.1	8%	5.4	13%	72%
Raw material costs: Feed costs	6.5	16%	6.6	18%	7.1	17%	7%
Raw material costs: Livestock costs	0.0	0%	6.0	16%	12.2	29%	101%
Other operational costs	12.2	30%	1.0	3%	2.6	6%	151%
Total operating costs			*29.5*	*79%*	*38.3*	*92%*	*30%*
Capital Costs (million €)							
Depreciation of capital			0.4	1%	5.1	12%	1077%
Financial costs, net			0.1	0%	0.2	0%	105%
Extraordinary costs, net			0.7	2%	0.1	0%	-91%
Capital value (million €)							
Total value of assets			188.3	505%	223.8	536%	19%
Net Investments			172.1	462%	179.1	429%	4%
Debt			79.9	215%	121.0	290%	51%
Performance Indicators (million €)							
Gross Value Added			17.0	46%	12.3	29%	-28%
Operating Cash Flow			7.8	21%	3.4	8%	-56%
Earning before Interest and Tax			7.3	20%	-1.6	-4%	-122%
Net Profit			7.2	19%	-1.8	-4%	-125%
Capital Productivity			9.0		5.5		
Return on Investments (%)			3.9		-0.7		
Financial position (%)			57.6		45.9		
Future Expectation Indicator (%)			91.2		77.8		

5.21.2 Structure and economic performance of the sector's main segments

The production in brackish and salt water shows an upward trend, verifying the concentration of the Portuguese aquaculture in 3 segments around the main species: sea bass & sea bream, turbot and sole, and clams.

The total sales volume was 5,037 tonnes with a corresponding income of 38.7 million Euros, in 2010.

Sea-bass and sea-bream on growing:

Composed by 66 establishments, this segment has a total sales volume of 1,118 tonnes and the income of about 6.1 million Euros. This segment is characterized by traditional production using earth ponds with high maintenance costs and low production densities. The welfare of fish and the environment are taken in high regard and the final product is of high quality.

In 2010, the costs of repair and maintenance of earth ponds continued to be high, because many establishments are changing the structure of the establishments and reconverting some of the production from fish to molluscs.

Other marine fish (turbot and sole) on growing:

Production in this segment is intensive (mainly turbot and sole), with only 9 establishments in the segment, has a total sales volume of 1,401 tonnes and of income of about 10 million Euros.

The production of turbot has duplicated in quantity and value compared to the previous year.

Clam bottom culture:

With 1,314 establishments and a turnover of about 22.7 million Euros this is the most relevant segment in the Portuguese aquaculture. Establishments are mostly small familiar units run by the owner and its relatives. Bottom culture has a very low level of investments and operational costs are mostly wages and salaries (60 % of total operational costs).

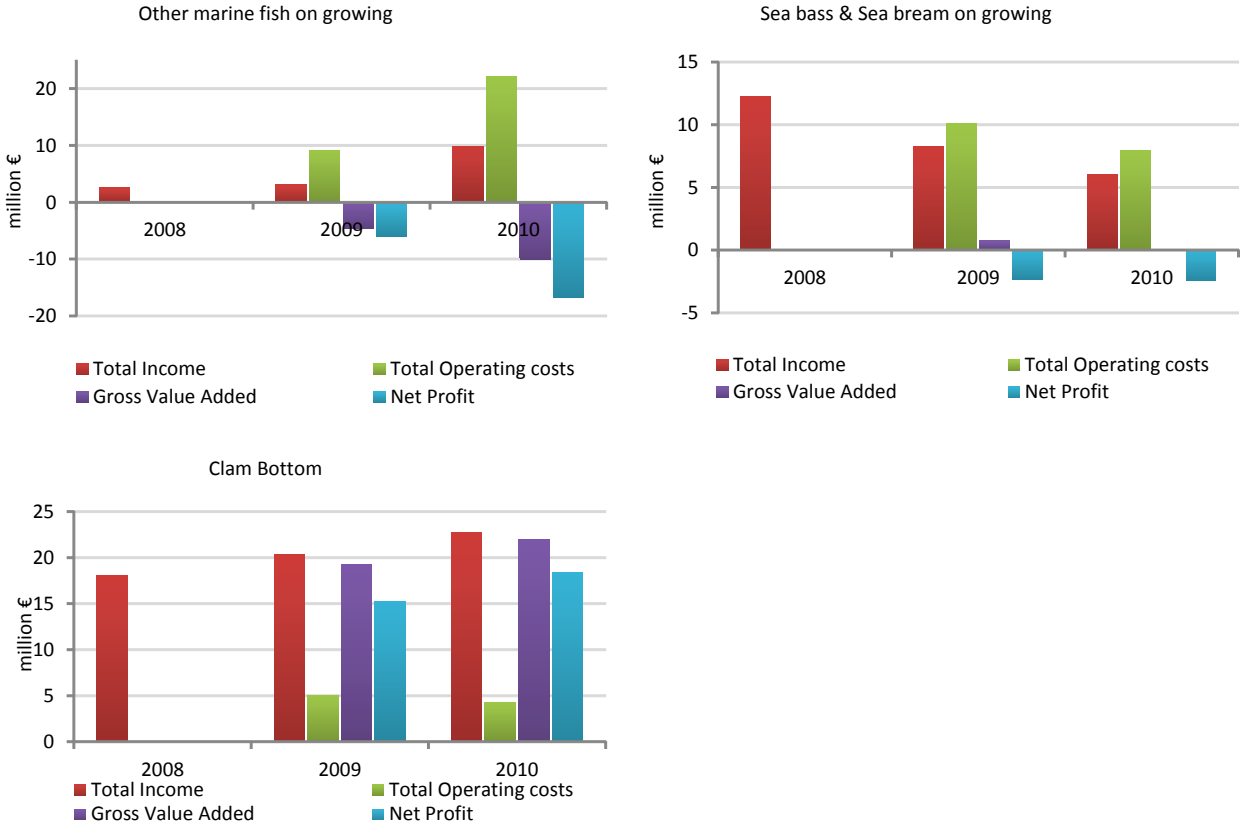
In Table 5.21.3, the economic indicators for the three Portuguese segments are presented. From the table it can be seen that the only segment that provides a positive EBIT and net profit is the clam bottom culture segment.

Table 5.21.3 Economic performance for Portugal at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Clam Bottom							
Total Income (million €)	18.1	100%	20.4	100%	22.7	100%	12%
Gross Value Added (million €)			19.3	95%	22.0	97%	14%
Operating Cash Flow (million €)			15.3	75%	18.4	81%	21%
Earning before Interest & tax (million €)			15.3	75%	18.4	81%	21%
Net Profit (million €)			15.3	75%	18.4	81%	21%
Volume of sales (thousand tonnes)	2.1		2.2		2.5		16%
Other marine fish on growing							
Total Income (million €)	2.8	100%	3.3	100%	10.0	100%	199%
Gross Value Added (million €)			-4.6	-137%	-10.2	-103%	124%
Operating Cash Flow (million €)			-6.0	-179%	-12.3	-123%	105%
Earning before Interest & tax (million €)			-6.0	-179%	-16.7	-168%	180%
Net Profit (million €)			-6.0	-179%	-16.8	-169%	181%
Volume of sales (thousand tonnes)	0.3		0.4		1.4		221%
Other shellfish Bottom							
Total Income (million €)	0.8	100%	0.5	100%	0.2	100%	-64%
Gross Value Added (million €)			0.4	92%	0.2	92%	-64%
Operating Cash Flow (million €)			0.4	78%	0.1	81%	-63%
Earning before Interest & tax (million €)			0.4	78%	0.1	81%	-63%
Net Profit (million €)			0.4	78%	0.1	81%	-63%
Volume of sales (thousand tonnes)	0.1		0.1		0.1		-10%
Oyster Bottom							
Total Income (million €)	3.5	100%	1.6	100%	1.2	100%	-25%
Gross Value Added (million €)			1.1	71%	0.9	73%	-24%
Operating Cash Flow (million €)			0.8	51%	0.5	46%	-33%
Earning before Interest & tax (million €)			0.8	51%	0.4	34%	-49%
Net Profit (million €)			0.8	51%	0.4	34%	-49%
Volume of sales (thousand tonnes)	0.8		0.6		0.6		-7%
Sea bass & Sea bream cages							
Total Income (million €)	1.7	100%	1.6	100%	0.0	100%	-98%
Gross Value Added (million €)			-0.1	-6%	-0.7	-2761%	627%
Operating Cash Flow (million €)			-0.1	-9%	-0.8	-3081%	493%
Earning before Interest & tax (million €)							
Net Profit (million €)							
Volume of sales (thousand tonnes)	0.5		0.4		0.0		-99%

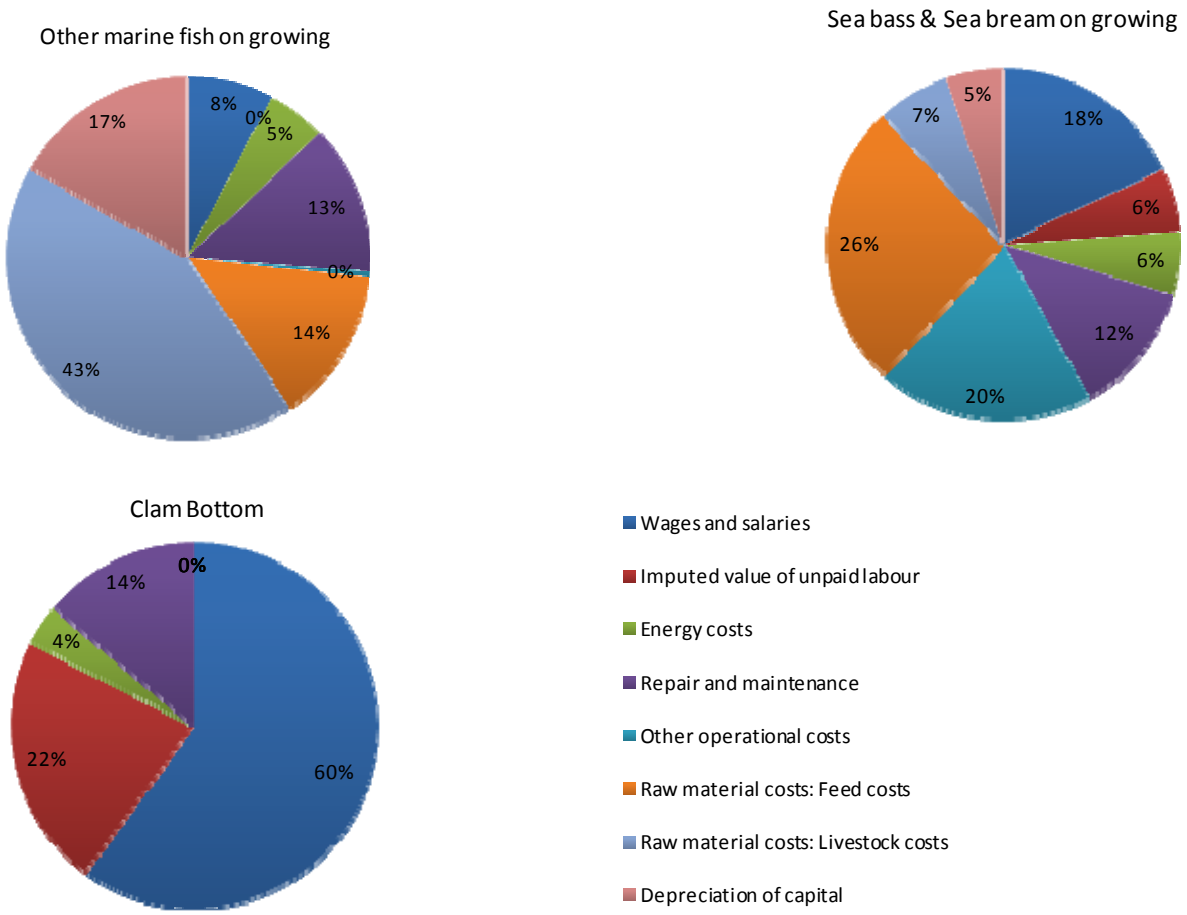
Sea bass & Sea bream on growing							
Total Income (million €)	12.3	100%	8.3	100%	6.1	100%	-27%
Gross Value Added (million €)			0.8	10%	0.1	2%	-85%
Operating Cash Flow (million €)			-1.9	-23%	-1.9	-31%	-1%
Earning before Interest & tax (million €)			-2.2	-27%	-2.3	-38%	3%
Net Profit (million €)			-2.3	-28%	-2.4	-40%	4%
Volume of sales (thousand tonnes)	2.2		1.5		1.1		-25%
Trout on growing							
Total Income (million €)	1.7	100%	1.2	100%	1.6	100%	35%
Gross Value Added (million €)			-0.1	-11%	0.4	27%	-435%
Operating Cash Flow (million €)			-0.3	-29%	-0.2	-11%	-47%
Earning before Interest & tax (million €)					-0.2	-14%	
Net Profit (million €)					-0.2	-16%	
Volume of sales (thousand tonnes)	0.7		0.5		0.7		29%

Figure 5.21.3 Economic performance indicators per segments for Portugal: 2010.



In figure 5.21.2, it is shown the economic performance of the three most significant Portuguese segments. From the figures it can be seen two segments were the gross value added is positive, but the net profit is negative in most years, except in clam bottom culture.

Figure 5.21.4 Cost structure of main segments for Portugal: 2010



In Figure 5.21.3, we see that the sea bass & sea bream on growing segment show the traditional cost composition for an earth ponds aquaculture establishment, where the main cost components are feed and livestock, which covers 33% of the total operational costs.

In the segment other marine fish on growing, the main cost components are also feed and livestock, which covers 58 % of the total operational costs. The energy cost covers 6 % of the total cost, which is the same as the segment in sea bass & sea bream on growing.

The segment of clam bottom culture has a totally different cost structure because the production does not include cost of feed and livestock. The most important cost item then is wages and salaries.

5.21.3 Trends and triggers

Portugal's aquaculture is largely confined to offshore sites and estuaries. Almost 90% of aquaculture facilities are located in public domain areas, based on 10-year private concessions, renewable for successive identical periods. The establishments are characterised by a great deal of extensive farming, largely family-based. There has been a move to encourage aquaculture as an alternative for fishermen facing reduced fishing quotas.

Aquaculture in Portugal, largely mollusc-based, is less likely to have significant environmental impacts than, for example, large-scale aquaculture facilities. Some aquaculture facilities were installed in public domain areas, without prejudice to the rules required by law and taking into consideration the need to conciliate the aquaculture production with environmental protection, through production methods environmentally friendly.

The aquaculture activities in Portugal are subject to a significant number of planning tools, planning and management that stand out to National Ecological Reserve (NER), the Sector Plan for Net Nature 2000, the Costal Management Plan (CMP), the Municipal Master Plan (MMP), Planning of Protected Areas (PPA), Maritime Spatial Plan (MSP) and Marine Strategy Framework Directive (MSFD).

The prospect of aquaculture production growth requires the availability of space for the deployment of new establishment in the coastal sea. These spaces must have adequate conditions and bring some advantages to the activity. This is particularly important in the installation of facilities offshore, given the wide range of conditions that must meet, many of them with quite significant effort in terms of investment, production costs and plant safety.

The work in coastal waters, estuaries and lagoons of the maritime area is vital to the development of business and to simplify and expedite the process for its licensing. The degree of simplification and speed of licensing in this activity depends strongly on the identification of areas with a vocation for aquaculture under the processes of spatial planning and the previous definition, by all entities involved in the licensing, the characterization of the activity to develop. It is currently promoted the viability of aquaculture in areas with potential and identified in the MSP, with simplified licensing procedures.

Portugal has not yet implemented the sector-specific plan for aquaculture, however continues to be one of its priorities. This sector plan concerns the identification of areas with fitness aquaculture in the coastal, estuarine-lagoon areas and offshore.

Production in the open sea is an alternative production method available to the sector. Though not being the solution of all conflicts or difficulties that confronts the traditional production is a way to consider given the characteristics and methodology of the production system, may also be put at different market niches, generating a positive reception.

Aquaculture in Portugal needs to address a number of significant problems, notably competition from intensive aquaculture of other countries, whose products are imported. The need to differentiate Portugal's product acted as a main driver in his efforts to certify the production, with many facilities considering becoming more ecological. The goal of national fisheries policy in regard to aquaculture is to increase not only the production and product diversity, but also the product quality, in order to improve the sector's competitiveness. Structural modernization is also being promoted within the current fisheries management plan. These objectives are consistent with those established by the EU in the Common Fisheries Policy (CFP), and particularly the Strategy for the Sustainable Development of European Aquaculture, which promotes environmental, economic and social sustainability.

Under the European Fisheries Fund (EFF) is expected to finance very important set of actions for the sustainable development of this sector. In addition to supporting projects of installation or conversion / modernization of existing companies, there is also available support to the development of pilot projects and collective actions.

In order to bring more stability and competitiveness to the sector, additional financial resources are needed to support the adoption of some measures like the providing insurance for specific risks of this activity at suitable prices (a subsidised insurance for the aquaculture sector is currently being analysed).

Aquaculture thus appears as a key factor to consider the future demand for fish. The growth of aquaculture production in the near future is the only expected route to increase Portugal domestic production of fish and bivalve molluscs. So, there is the need to continue investing in training and qualification for this activity and make it attractive not only for new investors but also for young managers.

5.21.4 Data coverage and Data Quality

It is important to call the attention for the following issues:

- For the first time the data were registered directly by the producers, which is an important measure for the sector. However some inconsistencies have been found. Some of the questioners are been doubled checked with the producers. So, 2010 data should be analysed with caution;

- The data for 2010 is based in a sample of 597 establishments, which cover 41 % of the total population of 1,459 establishments;

- The reduction in the imputed value of self-employed labour from 2009 to 2010 could be explained by methodological issues, because the calculation of the variable is based and estimated on the answers from a survey, and in 2010 there were fewer answers and the value is smaller;

- It is obligatory for all aquaculture producers in Portugal to report the production in volume and value and economics and social data each year, for the species and system of production they are authorized;

- The large number of segments brings some confidentiality issues and some aggregations were needed. The techniques used in the production and the species were take into consideration as aggregation criteria;

- Concerning the segment 9.3 (clam bottom), where most of the Portuguese aquaculture establishments (94 %) are included, their ownership do not have an organized business accounting, so it was not possible to obtain some economic indicators, like total capital value of assets and capital costs (net investment, debts, depreciation, etc);

- The sales value and volume data used in the data collection program was the same used to compile the production statistics for Eurostat and FAO.

5.22 ROMANIA

5.22.1 Overview of the sector

Romania started to collect data for the aquaculture sector in 2009. The evolution of the sector can be seen in Table 5.22.1 showing an increase between 2009 and 2010 from 315 to 444 on the number of units have license for production, in the all regions of the country. The increase on the number is due to the opportunities to practice aquaculture in natural ponds, including puddles, without special technical facilities. This availability has a result the increasing number of employees from 3,933 in 2010 to 2,669 in 2009, resulting in a 47 % increase. This increase reflects the orientation of investors who believed that could be a better investment instead of investing the money in the bank where it is obtained a lower interest rate than before.

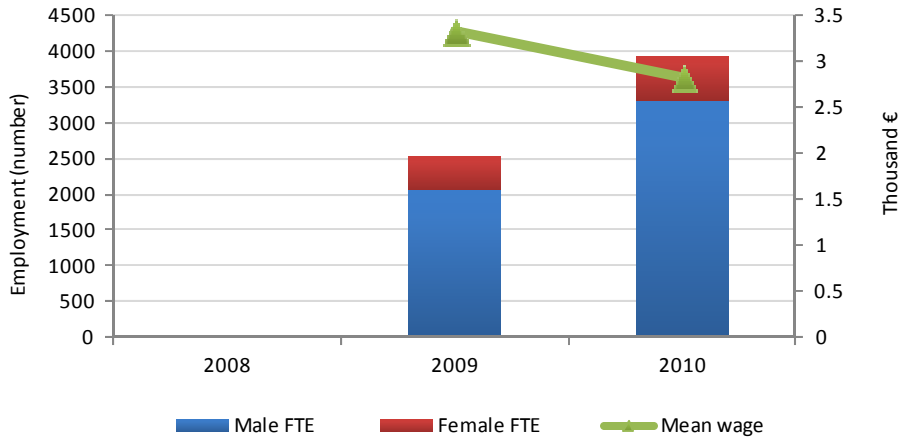
Table 5.22.1 Sector overview for Romania: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises		*315*	*444*	*41%*
<= 5 employess		170	227	34%
6-10 employess		79	101	28%
> 10 employees		66	116	76%
Employment (number)				
Total employees		*2669*	*3933*	*47%*
Male employees		2135	3330	56%
Female employees		534	603	13%
FTE		*2542*	*3932*	*55%*
Male FTE		2065	3330	61%
Female FTE		477	603	26%
Input & Production (thousand tonnes)				
Raw material volume: Feed		11.0	27.8	154%
Raw material volume: Livestock		3.4	5.0	49%
Production volume		7.3	12.9	76%
Indicators				
FTE per enterprices		8.1	8.9	10%
Average wage (thousand €)		3.3	2.8	-15%
Labour productivity (thousand €)		9.9	3.3	-66%

Considering the size of farms, the sector is dominated by small farms with a number of equal or less than 5 employees (227 units, approximately 51 %), followed by farms with more than 10 employees (116 units, around 26 %), and the last one is the medium size farms, with between 6 to 10 employees (101 units 23 %). The increase on the number of small farms is due to the possibility to practice aquaculture in the natural ponds, including puddles.

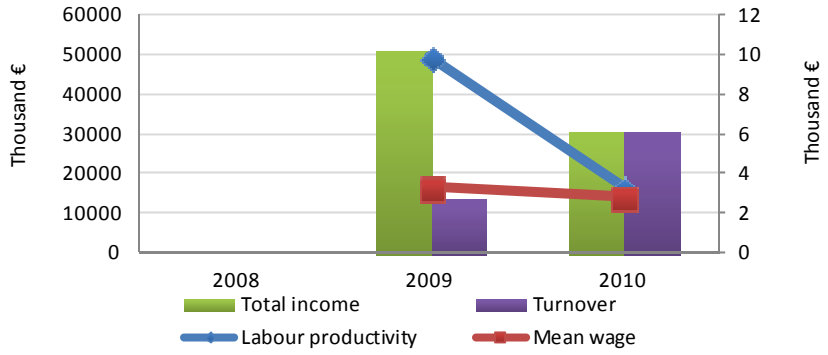
The aquaculture sector faces the problems of the economic crises, people are being hired in condition of decreased salaries. The owners chose to invest in maintaining stocks. In the Table 5.22.2 the figures illustrate the situation in 2010 when despite the increase of production reported (but not sold in the market), the acquisition of raw material, both feed and livestock, increased. They preferred to keep the production in their own farms, even they reported as final production which was recorded as "final" production - records according to the monitoring rules on the estimates of the aquaculture producers getting licenses. The hope was to sale in better condition the products on the internal market in the coming season. Meanwhile this could be an effect of a lower number of specialists in aquaculture and as a manner of diversifying the portfolio of investments.

Figure 5.22.1 Romania employment trends: 2008-2010.



Despite the expansion of the number of farms and employees in 2010 the mean wage decreased by 15 % and labour productivity by 66 %, comparing with 2009. This situation reflects the declining of the profitability of the sector in 2010. The structure of employees by gender is different in 2010, as a number and FTE : 3330 male and 603 female, all of them engaged in full time; the difference between 2009 (20 % female) and 2010 (15 % female) shows the preferably male to be engaged for the isolated locations of farms.

Figure 5.22.2 Romanian income, wages and labour productivity trends: 2008-2010.



The lack of specialists in the sector is reflected, also, by the decreasing productivity level. The figure 5.22.2 reflects the results of the wrong decisions taken by the owners in 2010.

Table 5.22.2 Economic performance for Romania: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover			13.9	27%	31.2	100%	124%
Other income			38.8	76%	0.0	0%	-100%
Subsidies			0.0	0%	0.0	0%	
Total income			*51.3*	*100%*	*31.2*	*100%*	*-39%*
Expenditure (million €)							
Wages and salaries			7.5	15%	10.8	35%	45%
Imputed value of unpaid labour			1.0	2%	0.3	1%	-67%
Energy costs			3.2	6%	1.7	5%	-49%
Repair and maintenance			5.6	11%	1.1	4%	-80%
Raw material costs: Feed costs			4.7	9%	7.4	24%	56%
Raw material costs: Livestock costs			4.6	9%	5.4	17%	19%
Other operational costs			9.5	19%	2.5	8%	-73%
Total operating costs			*36.1*	*70%*	*29.3*	*94%*	*-19%*
Capital Costs (million €)							
Depreciation of capital			2.8	6%	3.8	12%	33%
Financial costs, net			0.4	1%	0.8	3%	92%
Extraordinary costs, net			1.3	3%	2.1	7%	61%
Capital value (million €)							
Total value of assets			175.8	343%	381.4	1224%	117%
Net Investments			15.9	31%	19.7	63%	24%
Debt			49.5	96%	58.9	189%	19%
Performance Indicators (million €)							
Gross Value Added			25.1	49%	13.0	42%	-48%
Operating Cash Flow			15.2	30%	1.9	6%	-87%
Earning before Interest and Tax			12.3	24%	-1.9	-6%	-115%
Net Profit			11.9	23%	-2.7	-9%	-122%
Capital Productivity			14.3		3.4		
Return on Investments (%)			7.0		-0.5		
Financial position (%)			71.8		84.6		
Future Expectation Indicator (%)			7.4		4.2		

As mentioned before, the upper figure illustrates the negative effects in aquaculture annual profitability indicators due to the "policy" to invest in increasing production and keeping it in the own farms, recording the related costs to this production. All these have a result of the decreasing the total income of the sector, as well the deterioration of the profitability indicators, as per total and per each segment.

In Table 5.22.2 could be seen a general reduction of the activity, due to the reduction in concern for obtaining funds from other activities given that sales profitability remain at modest rates, despite the increase in volume. So no other income reported and collected through the questionnaire used for data collection. One other effect of the changes in the market, because of the economic crises, is the reduction of the costs, except the raw materials cost (feed and live stock). In order to reduce the losses on the market, and to face to the changing conditions, the general approach was to maintain the farms and the stock, reducing the other costs at the maximum possible.

Table 5.22.2 reflects the actual status of the sector for 2010 and the respective evolution of the expenditures and the general approach of operators.

The new opportunities for practising aquaculture in natural ponds, including puddles, resulted in an increase number of licenses granting the minimum conditions to practice aquaculture is reflected in the increase of investments, the number of units, the amount of salaries and wages (corresponding to a larger number of employees), and also to an increase of production obtained, and recorded as total turnover. This quantitative expansion of the sector reflects the poor preoccupation for qualitative improvements needed by the sector, for the overall, and in each segment.

The qualitative indicators are at a lower level than the previous year, as a consequence of the extensive "growth" reported by the aquaculture farms in 2010.

5.22.2 Structure and economic performance of the sector's main segments

The main sectors in 2010 remain the same as in 2009. The main species are the fresh water species, dominated by the carp family (including Asiatic species) divided in the segments: carp combined and carp on growing farms. There have been no changes in the techniques used for carp species farms, the dominated is the land base in an extensive way.

Combining the species cultured, the third type of fresh water species is not relevant, having less than 10 % as quantity produced in total production of aquaculture; these species are represented by: pike, catfish, perch, etc.

The second segment is trout still concentrated in the raceways farms, located in the mountain area, 80 % of them belonging to state property.

Table 5.22.3 Economic performance for Romania at segment level: 2008-2010.

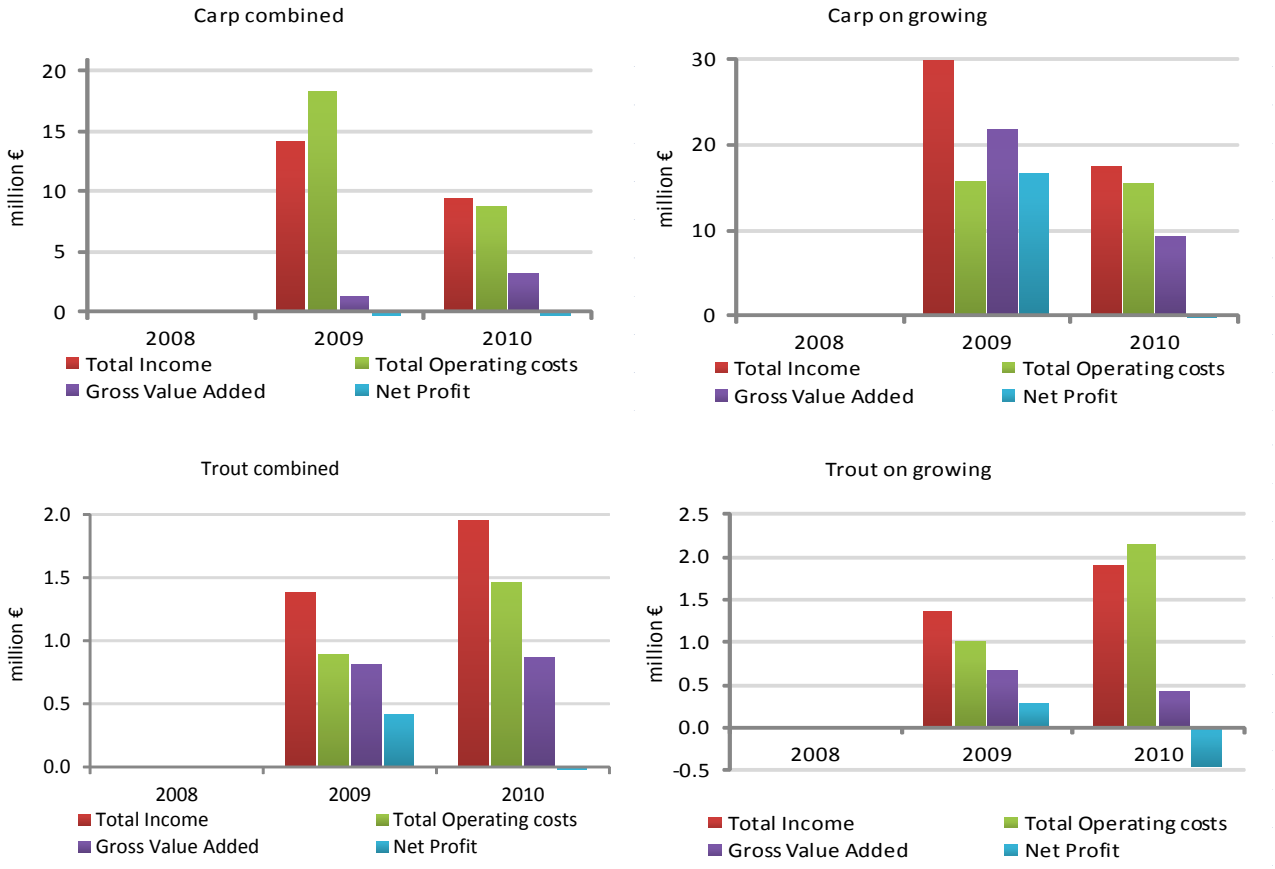
	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Carp combined							
Total Income (million €)			14.1	100%	9.3	100%	-34%
Gross Value Added (million €)			1.3	9%	3.1	33%	144%
Operating Cash Flow (million €)			-4.2	-30%	0.5	5%	112%
Earning before Investments & tax (million €)			-5.7	-41%	0.0	0%	100%
Net Profit (million €)			-5.9	-42%	-0.4	-4%	93%
Volume of sales (thousand tonnes)			4.3	31%	3.8		-13%
Carp on growing							
Total Income (million €)			33.6	100%	17.5	100%	-48%
Gross Value Added (million €)			21.7	65%	9.0	52%	-58%
Operating Cash Flow (million €)			17.9	53%	2.1	12%	-88%
Earning before Investments & tax (million €)			16.8	50%	0.2	1%	-99%
Net Profit (million €)			16.6	49%	-0.1	0%	-100%
Volume of sales (thousand tonnes)			2.5		7.5		198%
Trout combined							
Total Income (million €)			1.4	100%	1.9	100%	41%
Gross Value Added (million €)			0.8	59%	0.9	45%	6%
Operating Cash Flow (million €)			0.5	36%	0.5	25%	-1%
Earning before Investments & tax (million €)			0.4	30%	-0.6	-33%	-253%
Net Profit (million €)			0.4	30%	-0.7	-37%	-269%
Volume of sales (thousand tonnes)			0.2		0.7		296%
Trout on growing							
Total Income (million €)			1.4	100%	1.9	100%	39%
Gross Value Added (million €)			0.6	48%	0.4	22%	-37%
Operating Cash Flow (million €)			0.4	27%	-0.2	-13%	-169%
Earning before Investments & tax (million €)			0.3	20%	-0.4	-19%	-232%
Net Profit (million €)			0.3	20%	-0.5	-24%	-264%
Volume of sales (thousand tonnes)			0.3		0.7		165%

Table 5.22.3. Illustrate the economic performance of the main segments of the Romanian aquaculture. The sales of the segment carp combined decreased by volume with 13 % due to the fact of slow interest of farmers to sale on a market with a good demand and as a consequence the total income decreased by 34 %. The prices were good but the policy of the farmers didn't match with the buyers needs. The increase on the profitability indicators, despite the decrease of the total income, reflects the decrease of the costs, general speaking, as the Fig. 5.22.2 reflects. The net profit increased in 2010 compared to 2009, from 5.9 million Euros losses to 0.4 million Euros losses. The figures have a slight increase in 2010 compared to 2009.

The segment carp on growing faces the contrary situation, because of a volatile market. The sales volume increased by 198 %, but the total income decrease by 48 %. The situation is due to the market conditions, in which the competition with imported fish is very tough.

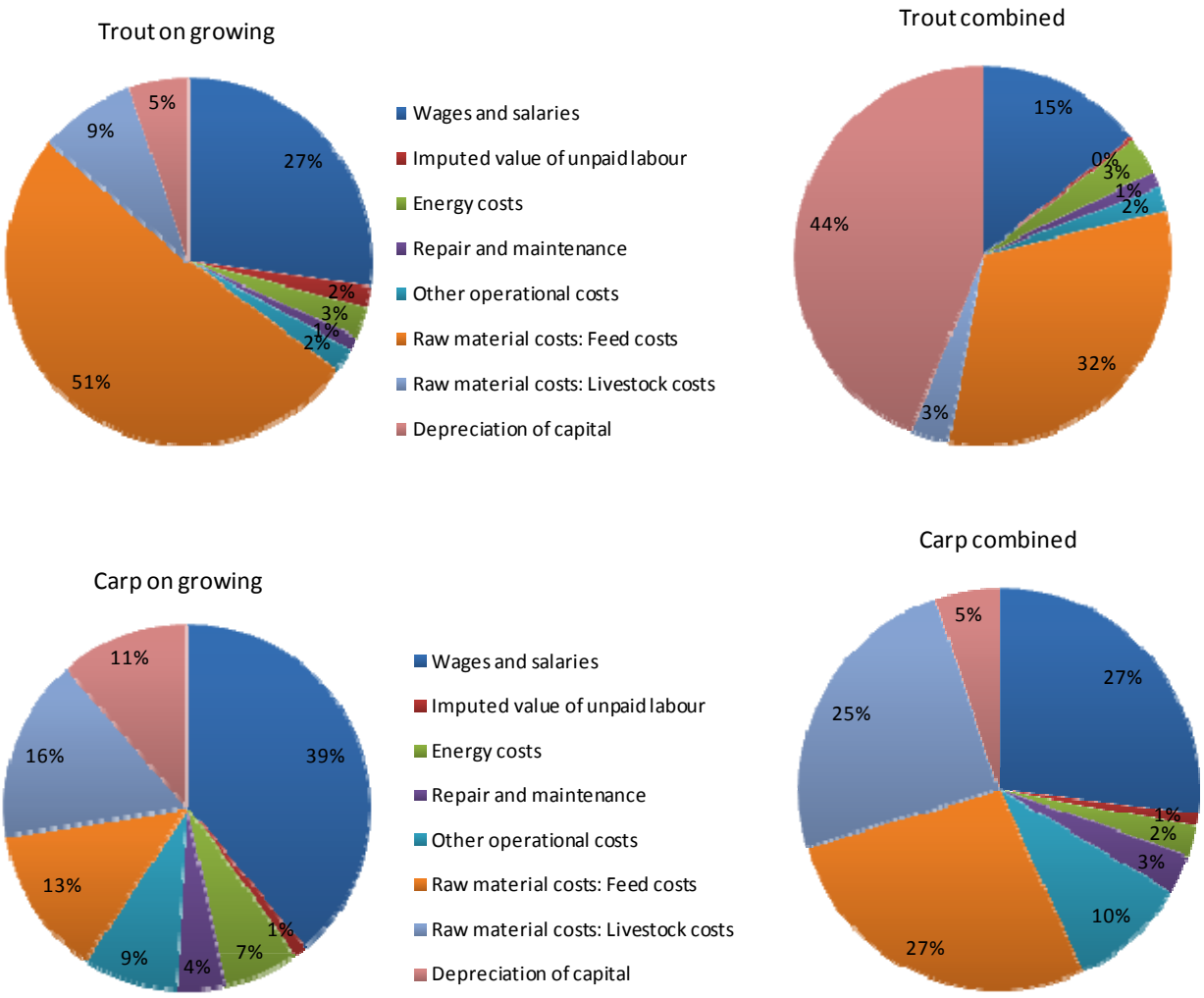
Both segments consist in culture species such as: carp, crucian carp, silver carp, bighead carp, grass carp with non alternative to be offered onto market. No exports are reported for this species.

Figure 5.22.3 Economic performance indicators per segments for Romania: 2010.



The both sectors of trout (combined and on growing) have the same situation as carp on growing. Despite the increase on sales by 296 % and 165 %, the total income increase only by 41 % and 39 %, due to the similar market conditions, with a high competition from imported trout. The main species cultured are: sea trout (65 %) and brook trout and rainbow trout.

Figure 5.22.4 Cost structure of main segments for Romania: 2010



As the figure 5.22.3 presents the structure of the costs for the main 4 segments of Romania aquaculture, the situation is quite different, accordingly with the structure of income figures and economic performances.

For trout on growing the main costs are raw materials-feed costs 51 %, wages and salaries 27 %, that mean 78 % of total costs. For trout combined 44 % form the costs is depreciation of capital (due to the special equipment for young fish development) followed by 32 % for raw material-feed costs, totalling 76 %, and wages and salaries 15 %.

For the carp segments, the situation is different - the aquaculture is practiced not only in special farms (with special invests in physical assets) but also in natural ponds, lakes and puddles (no special investments needed). So, the costs structure is represented by wages and salaries and raw material-feed costs: 52 % for on growing and 54 % for combined, followed by depreciation of capital 11 % for on growing and only 5 % for combined (due to the fact of the high age of physical assets).

The main characteristic of the whole aquaculture sector is the lack of new investments - tangible assets, technologies, etc.

5.22.3 Trends and triggers

The result of the various type of analysis could be done on the Romania aquaculture situation are stating a similar situation like in the last years, namely, the lack of investments (as shown above). In the same time the lack of any subsidies (direct or indirect) from the government is observed and there are no legal provisions in domestic legislation in this field. The new farms developed with EFF projects (i.e. for sturgeon culture) have started to produce from 2010, but still not at a significant level.

The economic crisis influenced badly the market and, consequently, the total incomes and sales for the aquaculture products. It is observed the continuity of the same concept of extensive aquaculture. The incapacity to adapt the production to the market conditions, and the preoccupation that new technologies can lead to a bad efficiency in the economic results and performances.

5.22.4 Data coverage and Data Quality

The year 2010 is the second year of data reporting exercise for Romania and some actions should be taken in order to improve the data coverage, and for collection with a better quality of the economic data, despite the "confidentiality" reason invocated by the data suppliers. The segmentation of the sector is according to the EU regulations.

5.23 SLOVAKIA

5.23.1 Overview of the sector

The Slovakian aquaculture sector produced 687 tonnes in 2010. This production was valued 1.9 million Euros (FAO, 2012). All Slovakian aquaculture production is freshwater, because it is a landlocked country.

Table 5.23.1 Production weight and value of the Slovakian aquaculture sector: 2008-2010.

	2008	2009	2010
Freshwater			
production volume (tonnes)	1.1	0.8	0.7
production value (thousand €)	2.8	1.8	1.9

(source: FAO, 2012)

Rainbow trout was the main species produced in 2010, with 79 % of the total production in weight and 80 % in value. Common carp (17 % and 15 % of total weight of production and total value of production, respectively) production is also significant.

Table 5.23.2 Top 5 species by aquaculture production weight and value in Slovakia: 2010.

	production volume (tonnes)
Species	
Rainbow trout	546
Common carp	117
Silver carp	8
Sea trout	6
Grass carp (=White amur)	5

	production value (thousand €)
Species	
Rainbow trout	1503
Common carp	282
Sea trout	48
Grass carp (=White amur)	12
Brook trout	9

(source: FAO, 2012)

5.24 SLOVENIA

5.24.1 Overview of the sector

Aquaculture in Slovenia comprises freshwater aquaculture (cold-water fish farming of salmonids, warm-water fish farming of cyprinids) and mariculture (fish and shellfish farming). Warm-water and cold-water fish farming has been practiced since the end of nineteenth century, while mariculture has a shorter history: it started at the end of the twentieth century. The major species contributing most of the production value in freshwater fish farming are rainbow trout (*Oncorhynchus mykiss*) and common carp (*Cyprinus carpio*), whilst in mariculture it is Mediterranean mussel (*Mytilus galloprovincialis*) and European seabass (*Dicentrarchus labrax*).

Mariculture practice is traditional. Fish farming takes place in cages submerged into the sea, while mussel farming takes place in a standard manner in lines of floating buoys linked together, with longline nets hung from them. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes. Currently, all the concessions for using marine water for the breeding of marine organisms have been granted, 2 of them for breeding marine fish and 20 for breeding shellfish. The total area for breeding fish at sea (excluding shellfish farming) in 2009 was 5,663 m2 (2 plots). The area of the 20 plots at sea that are used for shellfish farming was 45.1 ha.

Due to natural circumstances, the development of marine fish farming in Slovenia is limited. Mariculture takes place in the Bay of Strunjan, the Bay of Debeli rtič (shellfish farming) and in the Bay of Piran (fish and shellfish farming).

Mariculture shellfish farming is more important than fish farming regarding the total volume of sales. The major and the only cultured shellfish species, Mediterranean mussel , accounts for 58 percent of total mariculture production. The production of European seabass is more important than the production of gilthead seabream. It contributes 41 % to total mariculture production.

Since the early eighties (1982) the production of the Mediterranean mussel (*Mytilus galloprovincialis*) has been increasing and in 1988 it reached a maximum of 703 tonnes. After that year a significant decline was due to the fact that exports to Italy ceased. In 1995 the production of mussels reached a minimum of 12 tonnes. In recent years, there are increases in production, particularly due to the resolution of the status of shellfish production facilities through the granting of concessions for the use of marine water: first in 2001 and then in 2003, when production reached 135 tonnes, the highest since 1992. There was also a peak in production in 2009, with 311 tonnes of Mediterranean mussels produced. Current production covers mainly the needs of the domestic market. In recent years, considerable difficulties occurred in the production of shellfish due to the frequent closures of sales because of the occurrence of biotoxins, which prevents shellfish farms to be used to their full production capacity.

From 1991 onwards intensification was carried out especially with farming European seabass and seabream in the Bay of Piran. A first result of seabass production in 1992 was 5.7 tonnes. In subsequent years annual variations in production (growth and decline) were noted. In 2001 production reached its maximum with 59

tonnes, and very similar amounts were noted in 2003. Here, there was a peak in production in 2009 as well, with 65 tonnes of seabass.

The first results of seabream production in 1992 were 4 tonnes. In the following years there was a growth in production, with some variations, until 1997 when production reached a maximum of 61 tonnes. After that year production declined and reached a minimum of 6 tonnes in 2001. In 2003 production was 16 tonnes. In 2009, there was no production of seabream.

Slovenia is a net importer of fish and fish products. In 2010 imports were approximately four times larger than exports. There is a continuous import of fresh farmed species: seabream, seabass and salmon. The majority of the imported fish products come mainly from the European Union and are frozen, dried or processed.

Data, presented in this report, were collected only for the marine fish species.

Table 5.24.1 Sector overview for Slovenia: 2008-2010.

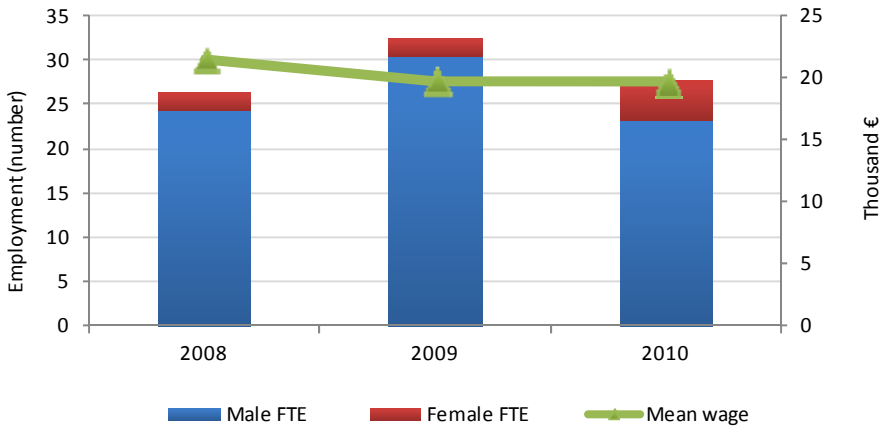
	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*11*	*11*	*13*	*18%*
<= 5 employess	10	10	11	10%
6-10 employess	1	0	1	
> 10 employees	0	1	1	0%
Employment (number)				
Total employees	*29*	*35*	*31*	*-11%*
Male employees	27	33	26	-21%
Female employees	2	2	5	150%
FTE	*26*	*32*	*28*	*-14%*
Male FTE	24	31	23	-24%
Female FTE	2	2	5	125%
Input & Production (thousand tonnes)				
Raw material volume: Feed	0.2	0.2	0.1	-30%
Raw material volume: Livestock	0.0	0.0	0.0	-84%
Production volume	0.3	0.4	0.1	-67%
Indicators				
FTE per enterprices	2.4	2.9	2.1	-27%
Average wage (thousand €)	21.5	19.7	19.7	0%
Labour productivity (thousand €)	85.8	66.1	85.7	30%

In 2010 were 11 companies in Slovenia dealing with shellfish farming, primarily with mussel farming (Mediterranean mussel). The shellfish are farmed using hanging ropes that are attached to rafts.

In the same year were only two companies that were engaged in breeding of fish. Main spaces for breeding are sea bream and sea bass. Main farming techniques is breeding in cages.

In 2010, Slovenia had 11 companies with 5 or less employees, one company with 6-10 employees and also 1 company with more than 10 employees. The status in employment reflects the situation in the aquaculture sector whereby the majority of small family farms operates with self employed persons, mostly one employee and some unpaid assistance from family workers.

Figure 5.24.1 Slovenia employment trends: 2008-2010.



In 2009 the turnover was about 711 thousand Euros, in 2010 the turnover has decreased by 56 % and amounted about 310 thousand Euros. This reduction in revenue was the result of prohibiting of the sale of shellfish in Slovenia, most of the year 2010, because of the phytotoxic organisms.

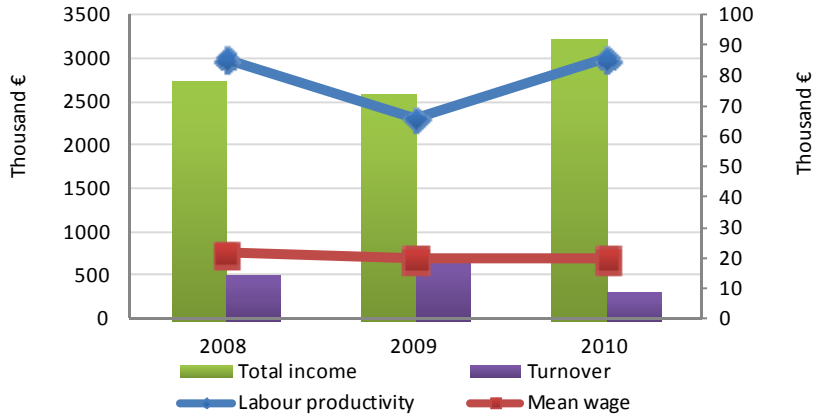
The total sales volume decreased from 380 tons in 2009 to 125 tons in 2010, a 67 % decrease.

In the Slovenian aquaculture sector there were 32 FTE employees in 2009 and 28 FTE employees in 2010. Employment therefore decreased by 14 %. With respect to the gender of those in employment, men predominate in aquaculture sector. In 2010, only 5 women were involved, a 16 % of the total Slovenian aquaculture employment.

The main segments in the Slovenian aquaculture sector are Sea bass & Sea bream cages (segment 3.4) and Mussel rafts (segment 7.1).

Average salary per employee measured in FTEs in 2009 was 19,727 Euros, while in 2010 the average salary per FTE employee was 16,095 Euros, accounting for a 18 % decrease.

Figure 5.24.2 Slovenian income, wages and labour productivity trends: 2008-2010.



The total amount of income generated by the Slovenian aquaculture sector in 2010 was 3.25 million Euros. This consisted of 0.31 million Euros in turnover, 0.45 million Euros in subsidies and 2.49 million Euros in other income (Figure and table 5.24.2). The total income of the Slovenian aquaculture sector increased by 18 % between 2008 and 2010, while turnover decreased by 40 % in the same period.

All the firms in the Slovenian aquaculture sector are registered to practice aquaculture and aquaculture should be their main source of income. However most of the income gain from carrying out other activities, such as Scuba diving, fish marketing, etc.

Total costs by the Slovenian aquaculture sector in 2010 were 1.32 million Euros. The largest expenditure items were crew wages (0.45 million Euros) and financial costs (0.22 million Euros), as can be seen from Table 5.24.2. Between 2008 and 2010, the total expenditure of the Slovenian aquaculture sector increased by 5 %, fluctuating between 1.32 million and 1.39 million Euros, largely due to changes in depreciation of capital and financial costs.

Table 5.24.2 Economic performance for Slovenia: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	0.5	19%	0.7	27%	0.3	10%	-56%
Other income	2.2	81%	1.9	73%	2.5	77%	32%
Subsidies	0.0	0%	0.0	0%	0.4	14%	
Total income	*2.8*	*100%*	*2.6*	*100%*	*3.2*	*100%*	*25%*
Expenditure (million €)							
Wages and salaries	0.6	21%	0.6	24%	0.4	14%	-29%
Imputed value of unpaid labour	0.0	0%	0.0	0%	0.1	3%	
Energy costs	0.1	3%	0.1	3%	0.1	2%	-10%
Repair and maintenance	0.1	2%	0.1	2%	0.0	1%	-37%
Raw material costs: Feed costs	0.2	9%	0.2	8%	0.1	4%	-29%
Raw material costs: Livestock costs	0.1	2%	0.1	4%	0.1	2%	-15%
Other operational costs	0.0	2%	0.0	2%	0.1	3%	94%
Total operating costs	*1.1*	*39%*	*1.1*	*43%*	*1.0*	*30%*	*-13%*
Capital Costs (million €)							
Depreciation of capital	0.1	4%	0.1	4%	0.2	6%	75%
Financial costs, net	0.1	3%	0.1	2%	0.2	7%	280%
Extraordinary costs, net	0.1	2%	0.1	3%	0.0	0%	-89%
Capital value (million €)							
Total value of assets	3.2	115%	3.1	118%	4.6	143%	52%
Net Investments	0.1	2%	0.0	1%	0.3	10%	900%
Debt	2.5	91%	2.5	95%	3.6	111%	46%
Performance Indicators (million €)							
Gross Value Added	2.3	82%	2.1	81%	2.4	73%	12%
Operating Cash Flow	1.7	61%	1.5	57%	2.3	70%	53%
Earning before Interest and Tax	1.6	57%	1.4	53%	2.1	64%	52%
Net Profit	1.5	55%	1.3	51%	1.9	58%	42%
Capital Productivity	71.2		69.3		51.1		
Return on Investments (%)	49.9		45.1		45.0		
Financial position (%)	20.9		18.8		22.2		
Future Expectation Indicator (%)	-1.4		-2.4		3.1		

5.24.2 Structure and economic performance of the sector's main segments

They are two main segments in the Slovenian aquaculture sector; Sea bass & Sea bream cages (segment 3.4) and Mussel rafts (segment 7.1). The most important species are Mediterranean mussel and European seabass.

In terms of sales volume mariculture shellfish farming is more important than fish farming. The major and the only cultured shellfish species, Mediterranean mussel , accounts for 58 % of total sales volume. The sales volume of European seabass is more important than the sales volume of seabream. It contributes 41 % to total mariculture production.

Since the early eighties (1982) the production of the Mediterranean mussel (*Mytilus galloprovincialis*) has been increasing and in 1988 it reached a maximum of 703 tonnes. After that year a significant decline was due to the fact that exports to Italy ceased. In 1995 the production of mussels reached a minimum of 12 tonnes. In recent years, there are increases in production, particularly due to the resolution of the status of shellfish production facilities through the granting of concessions for the use of marine water: first in 2001 and then in 2003, when production reached 135 tonnes, the highest since 1992. There was also a peak in production in 2009, with 311 tonnes of Mediterranean mussels produced. Current production covers mainly the needs of the domestic market. In recent years, considerable difficulties occurred in the production of shellfish due to the frequent closures of sales because of the occurrence of biotoxins, which prevents shellfish farms to be used to their full production capacity.

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Table 5.24.3 Economic performance for Slovenia at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Mussel rafts							
Total Income (million €)	1.2	100%	1.4	100%	1.6	100%	16%
Gross Value Added (million €)	1.1	90%	1.3	91%	1.4	90%	14%
Operating Cash Flow (million €)	0.8	68%	1.0	71%	1.3	82%	33%
Earning before Investments & tax (million €)	0.8	64%	0.9	68%	1.2	78%	33%
Net Profit (million €)	0.7	62%	0.9	67%	1.2	77%	33%
Volume of sales (thousand tonnes)	0.2		0.3		0.1		-77%
Sea bass & Sea bream cages							
Total Income (million €)	1.6	100%	1.2	100%	1.7	100%	35%
Gross Value Added (million €)	1.2	76%	0.9	71%	0.9	57%	9%
Operating Cash Flow (million €)	0.9	57%	0.5	41%	1.0	59%	93%
Earning before Investments & tax (million €)	0.8	52%	0.4	36%	0.8	51%	92%
Net Profit (million €)	0.8	49%	0.4	33%	0.6	39%	62%
Volume of sales (thousand tonnes)	0.1		0.1		0.1		-20%

In terms of sales volume, sales volume of the Mussel rafts segment represent 58 % of the total sales volume of Slovenian aquaculture sector in 2010. Turnover from this sector represent 15 % of the total turnover in the same year. In the Mussel rafts sector were 14.9 FTE employees in 2010, which represent 54 % of all FTE employees in Slovenian aquaculture sector in the same year.

In terms of other economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Slovenian Mussel rafts sector in 2010 was 1,438 thousand Euros, 1,306 thousand Euros, 1,248 thousand Euros and 1,226 thousand Euros respectively, see table 5.24.3 and figure 5.24.2.

Figure 5.24.3 Economic performance indicators per segments for Slovenia: 2010.

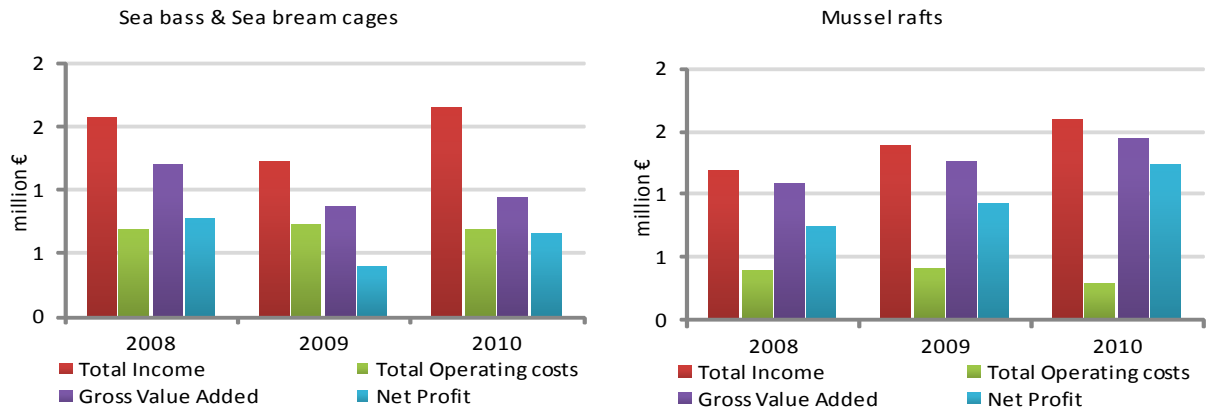


Figure 5.24.4 Cost structure of main segments for Slovenia: 2010

The largest cost item of Mussel rafts sector in 2010 were the Wages and salaries, accounted for 41 % of the total operational costs. Imputed value of unpaid labour made up 30 % of all operational costs. Energy costs, Repair and maintenance, other operational costs and livestock costs were 14 %, 7 %, 5 % and 3 %, respectively.

5.24.3 Trends and triggers

The Ministry of Agriculture, Forestry and Food is responsible for fisheries and aquaculture in Slovenia. Fisheries comprises capture fisheries, aquaculture of fish and other water animals and trade in fisheries products. Inland fisheries, fish farming and fish health are managed by three main Acts: the Freshwater Fishery Act, the Livestock-breeding Act (ZŽiv) and the Veterinary Service Act (Zvet) and their regulations, ordinance, etc. Marine fisheries, fish and mussel farming are regulated by Marine Fisheries Act (ZMR-2). In fisheries and aquaculture it is necessary to take into consideration the Environment Protection Act (ZVO), the Nature Conservation Act (ZON), and the Water Act (ZV).

The main leading government agency in fisheries and aquaculture is the Directorate of Forestry, Hunting and Fisheries within the Ministry of Agriculture Forestry and Food. The main task of the Directorate is to provide overall administrative control of aquaculture and fisheries, to ensure an adequate legislative framework for aquaculture and fisheries, and to carry out related legislative tasks. The Directorate is directly involved in controlling the operation of fish farms, licensing procedure of alien species or hybrids and is also responsible for the maintenance of fish stocks in natural waters. The concessions for the use of water, which are the prerequisite for setting up a fish farm in Slovenia, are, however, granted by the Ministry of Environment and Spatial Planning. The Directorate manages that part of the state budget which is designed for fisheries and aquaculture. The funds are used for a variety of purposes, including the financing of the setting up and the management of fisheries information systems; financing of performing public service in fisheries by the Fisheries research institute of Slovenia; for the protection of natural resources Development in the Republic of Slovenia 2007-2013; as well as for the collection of data in and monitoring in fisheries. Ecological, biological research and the breeding of some indigenous species (Danube salmon, grayling, nase) are conducted in the Fisheries Research Institute of Slovenia. The Marine Biology Station of the National Institute for Biology deals with interdisciplinary research of the sea.

There has been a dynamic change in the fish production sector due to economic changes in the period from the independence of Slovenia to its accession to the European Union and after the accession. In the future it would be reasonable to support research projects such as: analysis of potential possibilities in fish farming development in Slovenia with regards to spatial and hydrological circumstances and research into the possibility of economic farming of new species. It would also be reasonable to continue with investment in the modernization of older fish farms, especially the improvement of hygienic conditions and the construction of new fish farms which comply with EU legislation technologically and ecologically. It would also be necessary to adopt all outstanding fisheries legislation and encourage the establishment of aquaculture producer organisations with a view to the development of fish farming in terms of small and medium sized family fish husbandry. These measures would facilitate the more competitive position of Slovenian fish farming. Natural circumstances and conservation requirements in Slovenia do not allow the development of large industrial farms. The establishment of producer organisations would make it easier to obtain knowledge, new technology and reduce market costs.

Future development of Slovenian mariculture is strongly conditioned by the small size of the Slovenian Sea. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes. All Slovenian maritime fish and shellfish farms currently operating with about 50 % capacity. In the future we can expect increasing production to maximum capacity and then stagnation of Slovenian marine aquaculture.

On the other hand, because of the good quality and quantity of inland water, Slovenia has a good chance to increase freshwater aquaculture, particularly salmonid rearing such as rainbow trout, Huchen (Hucho hucho) and brown trout. Today is in Slovenia about 500 trout farms, with a total production of only about 1,000 tonnes per year.

5.24.4 Data coverage and Data Quality

Data were collected only for the marine fish species.

Regards to the data base ''The central register of aquaculture and commercial ponds'' from MAFF, in 2010, there were 11 operators in Slovenia dealing with shellfish farming and two subjects that were engaged in breeding of fish. The data for the operators mentioned were collected from multiple sources (AJPES, questionnaire, MAFF), allowing for cross checking. The accounting data, which are collected by the AJPES public agency, are already checked and verified. The data were collected for all 13 subjects.

In 2011 we improved a questionnaire for the purpose of collecting the socio-economic data for the aquaculture. In July 2011 the questionnaires for 2010 were sent to all thirteen operators and all of them also returned the questionnaire. Therefore, the response was 100 %.

Economic data on the aquaculture sector were collected from accounting records – AJPES and through questionnaires. The national program for collection of economic data for the aquaculture sector combines information from three main resources:

1. Questionnaire information returned from the aquaculture sector on a voluntary basis,

2. Data base: 'The central register of aquaculture and commercial ponds' from MAFF,

3. The annual accounts of business enterprises.

The data collected from all sources are combined in such a way that a complete set of accounting items is compared for each business enterprise.

In cases where a questionnaire, as the only source, was used the response rate was 100 %. In cases where the data from annual accounts of business enterprises was used the response rate was also 100 %, because we have economic reports for all investigated companies.

The economic variables were collected on the basis of Council Regulation (EC) No 199/2008 and the Appendix X to the Commission Decision (EC) 949/2008. Slovenia has uploaded the complete set of requested data to the JRC server before the deadline.

While due to confidentiality issues because of the low number of marine fish farms, we are only presenting Mussel rafts segment (segment 7.1) in the chapter 5.24.2: ''Structure and economic performance of the sector's main segments''.

Typical Slovenian maritime enterprise is small family fish/shell farm with self employed persons, mostly one employee and some unpaid assistance from family workers. Regarding techniques and species all Slovenian marine segments are very homogeneous. Marine fish farming practice is normally intensive and takes place in floating platforms where the cages are submerged into the sea. They produced mostly European seabass. Shellfish farming practice is extensive and takes place in lines of floating buoys linked together, where longlines with mussels are suspended. The major and the only cultured shellfish species is Mediterranean mussel.

In case of Slovenian data, there are differences between Eurostat and DCF data. The difference is because the Eurostat data also contain data from freshwater aquaculture.

List of acronyms and abbreviations

AJPES - The Agency of the Republic of Slovenia for Public Legal Records and Related Services.

MAFF - The Ministry of Agriculture, Forestry and Food of the Republic of Slovenia.

VARS - Veterinary Administration of the Republic of Slovenia.

5.25 SPAIN

5.25.1 Overview of the sector

Spain has an important aquaculture sector, highly diversified, producing different species of freshwater and marine fish, molluscs, crustaceans, and algae with different levels of relevance in terms of quantities and values. All these farming activities can be found spread all over the country.

In 2010 (the most recent year for available data) Spanish aquaculture had a total turnover of 469 million Euros, a 7 % increase from the previous year. About 90 % of these turnovers were coming from edible products. The rest of the production, 10 % of total value, consisted of eggs and juveniles as raw material for the fattening farms or for releases for hatchery supported fishery. Adding subsidies and other incomes to the turnover, the total industry's income results in more than 517 million Euros.

Farming activities are spatially distributed across the country and has a significant role in social and economic development in the involved coastal areas.

Total edible aquaculture production reached 253,800 tonnes in 2010, which means a decrease of a 5 % with respect to the previous year.

The production volumes of the Spanish aquaculture are dominated by far by mussels (*Mytilus galloprovincialis*), which is mostly concentrated in the North Western region of Galicia. They are grown on ropes hang from rafts. The number of rafts is 3,605 in Galicia, 170 in Catalonia and a small amount in Balearic Islands and Andalusia. Although the volume of mussel production reaches around 75 % of Spanish production, the value of this big production is just a 23 % of the total aquaculture.

Other molluscs are grown in inter tidal areas in a extensive production systems all around the Spanish shore, but also mainly concentrated in the area of Galicia.

On the other hand, fish production represents 24 % of production but 71 % in sales value. Among the fish, seabream has the largest production (20,358 tonnes), followed by rainbow trout (17,400 tonnes), seabass (11,500 tonnes) and turbot (nearly 7,000 tonnes).

All these species have suffered a decrease in production levels: seabream 12 %, seabass 9 % and turbot 4 %. Turbot production was increasing during several years until the last two years of the decade when it stagnated as the economic crisis worsened and consumers' purchasing power decreased.

Other commercial marine species in Spain are black spotted seabream, and sole, both with an important increase in production, in relative terms. Tuna ranching keep producing high incomes. Other promising activities are sturgeon and rainbow trout caviar, with nearly 2.5 million Euros in value and a yearly increasing trend.

Rainbow trout is the dominant species in freshwater aquaculture with declining production since the beginning of the new century, although it keeps the second position in volumes of harvested fish.

The structure of the sector is composed by 3,066 farm owners; most of the firms belong to individuals rather than legal entities, especially in the extensive and semi-extensive aquaculture like mussel in rafts, or clams in inter tidal areas. So, the figures show a high proportion of firms with less than 10 employees. However, the number of companies employing more than 10 staff is increasing in the current trend of concentration in bigger companies.

Employment has increased from 6,231 to 6,377 in full time equivalents (FTE), where 78 % are male and 22 % are female.

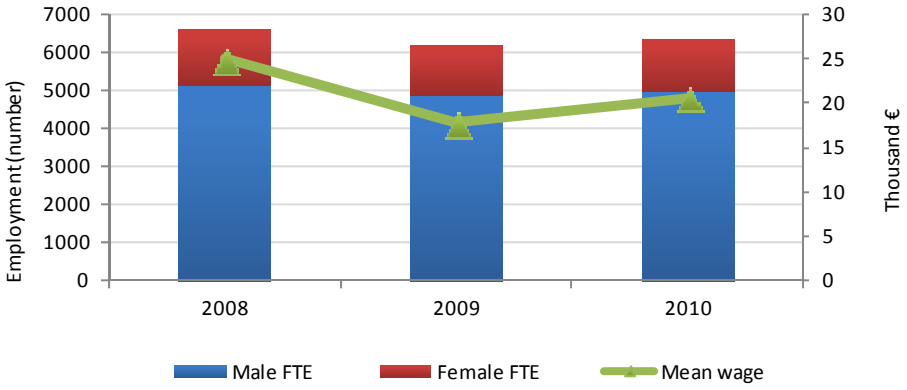
These proportions significantly change across the different segments; in the subsector of clams culture in intertidal zones, female employment is higher than in other segments. In the same way in this segment, a high percentage of the workers are part time employees.

Clams and mussels industries have the highest proportion of imputed value of unpaid labour, showing a familiar structure. They are activities with an important social impact in the areas where they are being developed.

Table 5.25.1 Sector overview for Spain: 2008-2010.

	2008	2009	2009	% change 2009-2010
Structure (number)				
Total enterprises	*3101*	*3105*	*3066*	*-1%*
<= 5 employess	2028	1976	2127	8%
6-10 employess	714	767	516	-33%
> 10 employees	359	362	423	17%
Employment (number)				
Total employees	*26322*	*28882*	*27907.21*	*-3%*
Male employees	18344	20692	19851.65	-4%
Female employees	7978	8190	8055.56	-2%
FTE	*6612*	*6176*	*6376.66*	*3%*
Male FTE	5124	4852	4995.38	3%
Female FTE	1488	1324	1381.28	4%
Input & Production (thousand tonnes)				
Raw material volume: Feed	154.2	127.5	122.3	-4%
Raw material volume: Livestock				
Production volume				
Indicators				
FTE per enterprices	2.1	2.0	2.1	5%
Average wage (thousand €)	25.0	17.8	20.6	16%
Labour productivity (thousand €)	15.2	11.5	25.2	119%

Figure 5.25.1 Spain employment trends: 2008-2010.



The mean wage rose from 17,600 in 2009 to 20,645 in 2010, recovering from a decrease experimented in 2008. Anyway, these figures in some segments, compared with previous years, are far from being realistic.

Labour productivity shows an improvement, with respect to the previous year. Probably the companies that have disappeared during the previous years (and fuelled by the economic crisis) have been those with the lowest levels of labour productivity (lower efficiency).

Figure 5.25.2 Spanish income, wages and labour productivity trends: 2008-2010.

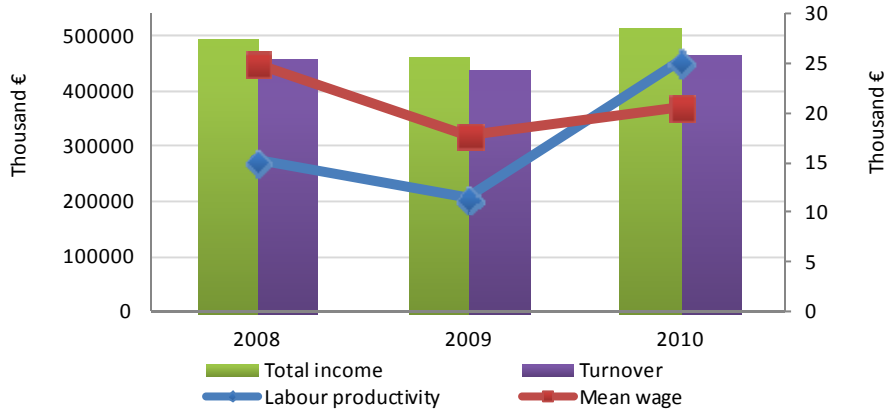


Table 5.25.2 Economic performance for Spain: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	462.6	93%	440.0	94%	469.4	91%	7%
Other income	21.7	4%	14.3	3%	32.2	6%	125%
Subsidies	11.4	2%	12.7	3%	15.8	3%	24%
Total income	*495.8*	*100%*	*467.0*	*100%*	*517.4*	*100%*	*11%*
Expenditure (million €)							
Wages and salaries	97.4	20%	87.1	19%	92.7	18%	6%
Imputed value of unpaid labour	67.9	14%	22.9	5%	38.9	8%	70%
Energy costs	13.3	3%	22.2	5%	20.8	4%	-6%
Repair and maintenance	13.6	3%	15.5	3%	15.3	3%	-2%
Raw material costs: Feed costs	96.8	20%	110.3	24%	118.8	23%	8%
Raw material costs: Livestock costs	152.9	31%	128.5	28%	83.4	16%	-35%
Other operational costs	106.9	22%	106.8	23%	102.6	20%	-4%
Total operating costs	*548.9*	*111%*	*493.3*	*106%*	*472.4*	*91%*	*-4%*
Capital Costs (million €)							
Depreciation of capital	12.7	3%	39.1	8%	40.4	8%	4%
Financial costs, net	-23.7	-5%	-17.8	-4%	-20.4	-4%	-15%
Extraordinary costs, net	15.4	3%	-8.6	-2%	3.0	1%	135%
Capital value (million €)							
Total value of assets	958.5	193%	522.3	112%	971.0	188%	86%
Net Investments	42.4	9%	20.4	4%	4.5	1%	-78%
Debt	84.8	17%	40.1	9%	37.1	7%	-8%
Performance Indicators (million €)							
Gross Value Added	100.8	20%	71.0	15%	160.8	31%	126%
Operating Cash Flow	-53.1	-11%	-26.3	-6%	45.0	9%	271%
Earning before Interest and Tax	-65.7	-13%	-65.3	-14%	4.5	1%	107%
Net Profit	-42.0	-8%	-47.5	-10%	25.0	5%	153%
Capital Productivity	10.5		13.6		16.6		
Return on Investments (%)	-6.9		-12.5		0.5		
Financial position (%)	91.2		92.3		96.2		
Future Expectation Indicator (%)	3.1		-3.6		-3.7		

When studying the cost structure, raw material is the most important item, followed by wages and salaries. The first one represents around 43 % and the labour costs are around 28 % of expenditure.

It is remarkable the fall of Livestock costs in one year in hatcheries of bass and bream. Declining market evolution may have caused a decrease in the demand of eggs and juveniles from these species farms.

In 2010 sector's profitability was 4.54 million Euros and its assets resulted profitable in a 0.47 % (ROI value). It is highlighted the improvement of the EBIT, which had a negative value in the previous year. The factors with bigger influence on this indicator's change are the increase of other incomes and the fall of certain costs, such as the energy costs, and overall the mentioned livestock costs. The GVA increased by 126 % during the last year. From the point of view of the incomes, the turnover increased 7 % from the previous year, becoming the highest in the sequence 2008-2010.

Subsidies received by the aquaculture sector represented around 3 % of the total incomes, a bit higher than in 2009.

The financial position indicator is supposed to show the level of debts in the different segments; in this sense it shows a favourable view, which may not match with reality according to alternative accountancy based sources[1]. This value could be underestimated here.

5.25.2 Structure and economic performance of the main segments

Table 5.25.3 Economic performance for Spain at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Clam Bottom							
Total Income (million €)	27.2	100%	12.7	100%	21.1	100%	66%
Gross Value Added (million €)	7.8	29%	-3.0	-23%	11.1	53%	-472%
Operating Cash Flow (million €)	-4.3	-16%	-11.4	-90%	-11.7	-56%	2%
Earning before Investments & tax (million €)	-4.6	-17%	-11.7	-92%	-12.4	-59%	6%
Net Profit (million €)	-4.4	-16%	-11.7	-92%	-12.2	-58%	5%
Volume of sales (thousand tonnes)	15951.4		10404.2		18378.8		77%

[1] SABI/AMADEUS

Clam Other							
Total Income (million €)	1.0	100%	1.0	100%	0.6	100%	-40%
Gross Value Added (million €)	0.3	25%	0.6	62%	0.2	41%	-60%
Operating Cash Flow (million €)	-0.4	-35%	0.1	7%	-0.2	-28%	-342%
Earning before Investments & tax (million €)	-0.5	-46%	0.1	6%	-0.3	-54%	-617%
Net Profit (million €)	-0.5	-44%	0.1	11%	-0.3	-46%	-352%
Volume of sales (thousand tonnes)	653.5		547.4		283.9		-48%
Clam rafts							
Total Income (million €)	0.3	100%	0.1	100%	1.0	100%	1126%
Gross Value Added (million €)	0.2	59%	0.0	30%	0.5	44%	1731%
Operating Cash Flow (million €)	0.0	-16%	0.0	-18%	0.1	7%	-573%
Earning before Investments & tax (million €)	-0.1	-21%	0.0	-19%	0.0	-4%	135%
Net Profit (million €)	-0.1	-21%	0.0	-18%	0.0	-2%	21%
Volume of sales (thousand tonnes)	287.4		165.2		929.8		463%
Mussel rafts							
Total Income (million €)	94.0	100%	98.0	100%	80.5	100%	-18%
Gross Value Added (million €)	32.4	34%	62.8	64%	51.0	63%	-19%
Operating Cash Flow (million €)	-36.1	-38%	39.8	41%	29.6	37%	-26%
Earning before Investments & tax (million €)	-37.1	-39%	36.0	37%	25.1	31%	-30%
Net Profit (million €)	-34.2	-36%	37.6	38%	29.1	36%	-22%
Volume of sales (thousand tonnes)	90058.1		96300.8		95729.3		-1%
Other freshwater fish combined							
Total Income (million €)	14.5	100%	4.8	100%	2.7	100%	-43%
Gross Value Added (million €)	5.6	38%	1.2	26%	1.1	42%	-10%
Operating Cash Flow (million €)	1.8	12%	-1.0	-20%	-0.3	-11%	-68%
Earning before Investments & tax (million €)	-0.2	-2%	-1.7	-35%			
Net Profit (million €)	0.8	5%	-1.3	-27%			
Volume of sales (thousand tonnes)	9312.7		1866.8		2827.3		51%
Other freshwater fish on growing							
Total Income (million €)	0.2	100%	4.0	100%	3.9	100%	-3%
Gross Value Added (million €)	0.1	36%	1.5	37%	1.1	28%	-27%
Operating Cash Flow (million €)	0.0	20%	1.0	25%	0.8	20%	-24%
Earning before Investments & tax (million €)			0.7	18%	0.5	12%	-37%
Net Profit (million €)			0.9	22%	0.6	15%	-35%
Volume of sales (thousand tonnes)	1012.1		3845.2		3620.0		-6%
Other marine fish cages							
Total Income (million €)	68.6	100%	28.9	100%	25.3	100%	-12%
Gross Value Added (million €)	28.3	41%	7.0	24%	7.0	28%	0%
Operating Cash Flow (million €)	23.5	34%	4.1	14%	3.9	16%	-4%
Earning before Investments & tax (million €)	22.1	32%	2.9	10%	2.9	11%	0%
Net Profit (million €)	24.2	35%	3.5	12%	3.7	15%	7%
Volume of sales (thousand tonnes)	45980.5		28874.4		25325.3		-12%

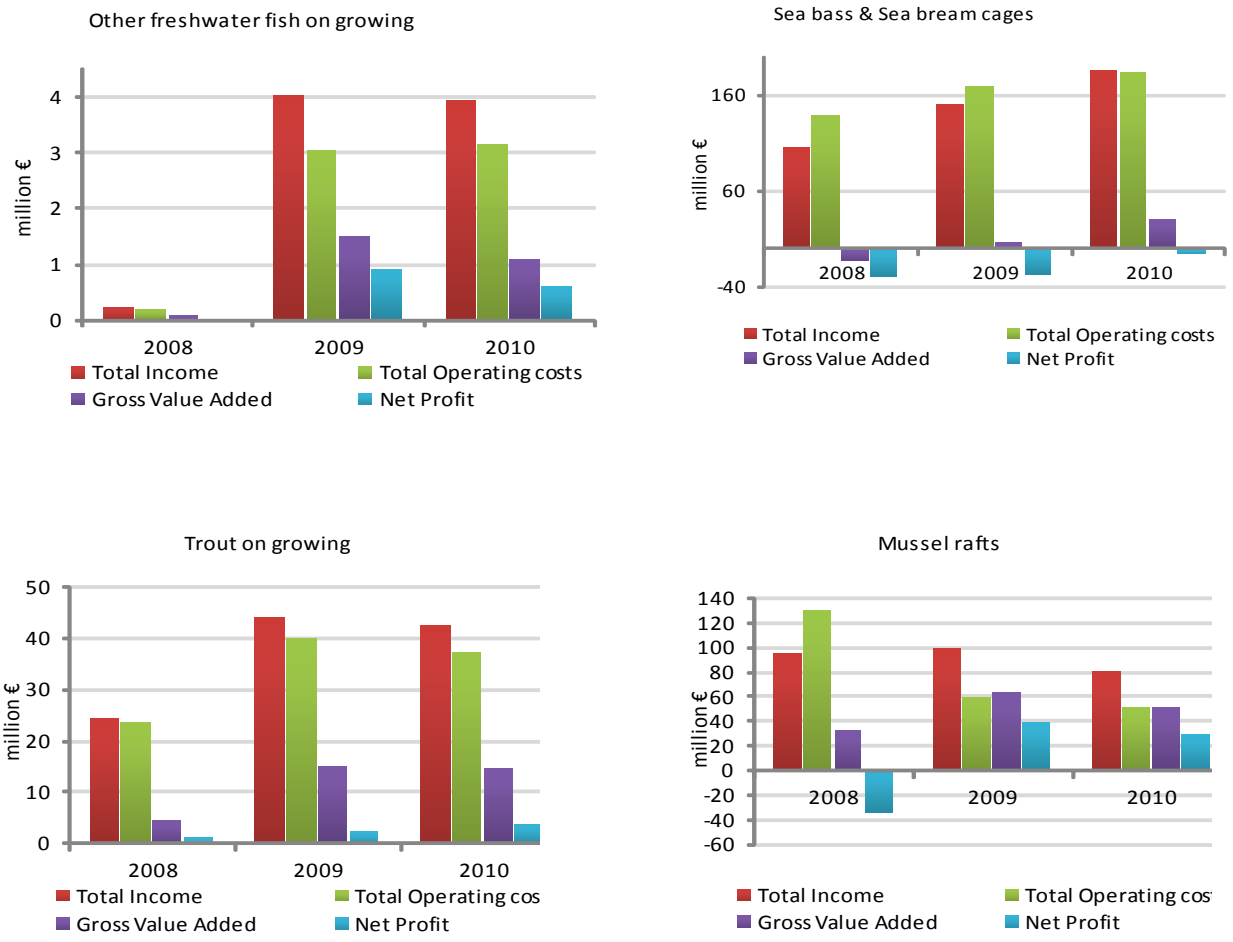
Other marine fish combined							
Total Income (million €)	30.3	100%	0.3	100%	2.7	100%	666%
Gross Value Added (million €)	1.7	6%	-0.1	-32%	1.3	50%	-1302%
Operating Cash Flow (million €)	-6.7	-22%	-0.1	-20%	0.6	22%	-933%
Earning before Investments & tax (million €)	-7.6	-25%	-0.1	-26%	0.3	10%	-400%
Net Profit (million €)	-4.2	-14%	-0.1	-19%	0.5	18%	-822%
Volume of sales (thousand tonnes)	33021.2		46.9		44365.7		94573%
Other marine fish on growing							
Total Income (million €)	26.4	100%	49.4	100%	57.5	100%	16%
Gross Value Added (million €)	9.5	36%	20.8	42%	27.7	48%	33%
Operating Cash Flow (million €)	5.2	20%	16.1	32%	20.9	36%	30%
Earning before Investments & tax (million €)			8.8	18%	11.5	20%	32%
Net Profit (million €)			13.4	27%	16.8	29%	25%
Volume of sales (thousand tonnes)	24711.9		52400.6		14535.5		-72%
Other shellfish Other							
Total Income (million €)	3.4	100%	5.1	100%	3.9	100%	-24%
Gross Value Added (million €)	-0.7	-22%	1.1	21%	1.4	36%	30%
Operating Cash Flow (million €)	-2.1	-63%	-0.9	-17%	-0.3	-8%	-66%
Earning before Investments & tax (million €)	-2.1	-63%	-2.4	-48%	-1.4	-35%	-44%
Net Profit (million €)	-1.7	-51%	-2.0	-40%	-1.0	-25%	-52%
Volume of sales (thousand tonnes)			1958.1		1883.8		-4%
Oyster Bottom							
Total Income (million €)	0.4	100%	0.5	100%	0.2	100%	-66%
Gross Value Added (million €)	0.1	29%	0.3	55%	0.1	36%	-77%
Operating Cash Flow (million €)	-0.1	-19%	0.1	14%	0.0	-12%	-129%
Earning before Investments & tax (million €)	-0.1	-26%	0.0	-4%	-0.1	-57%	385%
Net Profit (million €)	-0.1	-23%	0.0	-2%	-0.1	-54%	759%
Volume of sales (thousand tonnes)	367.8		457.7		65.1		-86%
Oyster rafts							
Total Income (million €)	6.1	100%	5.0	100%	1.0	100%	-79%
Gross Value Added (million €)	0.9	15%	1.0	19%	0.6	55%	-41%
Operating Cash Flow (million €)	-1.1	-18%	0.2	4%	0.5	44%	111%
Earning before Investments & tax (million €)	-1.2	-19%	0.1	3%	0.4	35%	146%
Net Profit (million €)	-1.2	-19%	0.2	4%	0.4	35%	106%
Volume of sales (thousand tonnes)	6115.9		5931.9		4871.1		-18%
Sea bass & Sea bream cages							
Total Income (million €)	105.4	100%	148.8	100%	184.7	100%	24%
Gross Value Added (million €)	-13.2	-13%	4.0	3%	28.0	15%	592%
Operating Cash Flow (million €)	-32.0	-30%	-19.8	-13%	1.4	1%	-107%
Earning before Investments & tax (million €)	-35.5	-34%	-35.1	-24%	-12.7	-7%	-64%
Net Profit (million €)	-29.6	-28%	-28.6	-19%	-5.8	-3%	-80%
Volume of sales (thousand tonnes)	119204.9		138459.9		137692.0		-1%

Sea bass & Sea bream combined							
Total Income (million €)	28.8	100%	4.0	100%	8.7	100%	119%
Gross Value Added (million €)	9.4	33%	1.8	45%	2.8	32%	57%
Operating Cash Flow (million €)	2.4	8%	0.7	18%	1.5	18%	111%
Earning before Investments & tax (million €)	0.9	3%	0.5	12%	1.5	17%	209%
Net Profit (million €)	1.8	6%	0.6	15%	1.8	21%	206%
Volume of sales (thousand tonnes)	25619.1		3894.5		10665.5		174%
Sea bass & Sea bream Hatcheries & nurseries							
Total Income (million €)	12.7	100%	30.7	100%	32.8	100%	7%
Gross Value Added (million €)	3.7	29%	-51.0	-166%	-2.1	-6%	-96%
Operating Cash Flow (million €)	0.5	4%	-62.1	-202%	-10.7	-33%	-83%
Earning before Investments & tax (million €)	-0.1	-1%	-65.9	-215%	-13.2	-40%	-80%
Net Profit (million €)	0.0	0%	-63.8	-208%	-12.3	-37%	-81%
Volume of sales (thousand tonnes)	15160.3		27722.1		25636.8		-8%
Sea bass & Sea bream on growing							
Total Income (million €)	12.6	100%	16.9	100%	27.5	100%	63%
Gross Value Added (million €)	-2.0	-16%	4.7	28%	7.8	28%	66%
Operating Cash Flow (million €)	-6.8	-54%	1.0	6%	0.5	2%	-49%
Earning before Investments & tax (million €)	-7.2	-57%	-0.5	-3%	-1.6	-6%	209%
Net Profit (million €)	-6.4	-50%	-0.2	-1%	-1.1	-4%	423%
Volume of sales (thousand tonnes)	12821.9		13652.4		18392.6		35%
Trout combined							
Total Income (million €)	38.7	100%	2.4	100%	3.5	100%	49%
Gross Value Added (million €)	12.6	32%	1.2	49%	0.9	24%	-25%
Operating Cash Flow (million €)	2.9	8%	0.6	25%	0.2	6%	-66%
Earning before Investments & tax (million €)	2.6	7%	0.6	24%	0.0	0%	-98%
Net Profit (million €)	3.3	9%	0.6	24%	0.0	1%	-92%
Volume of sales (thousand tonnes)	33887.9		2344.5		19490.5		731%
Trout Hatcheries & nurseries							
Total Income (million €)	0.2	100%	4.8	100%	16.2	100%	235%
Gross Value Added (million €)			1.7	35%	5.4	33%	215%
Operating Cash Flow (million €)	0.1	66%	0.6	13%	2.5	15%	289%
Earning before Investments & tax (million €)	0.0	1%	0.5	10%	1.3	8%	178%
Net Profit (million €)	0.0	3%	0.5	11%	1.3	8%	153%
Volume of sales (thousand tonnes)	2246.4		3433.8		3049.6		-11%
Trout on growing							
Total Income (million €)	24.1	100%	43.9	100%	42.5	100%	-3%
Gross Value Added (million €)	4.4	18%	15.0	34%	14.6	34%	-3%
Operating Cash Flow (million €)	0.7	3%	4.0	9%	5.5	13%	38%
Earning before Investments & tax (million €)	0.5	2%	1.9	4%	2.9	7%	53%
Net Profit (million €)	0.9	4%	2.1	5%	3.5	8%	64%
Volume of sales (thousand tonnes)	23116.9		44110.5		40825.3		-7%

Most of the defined segments are represented in Spain. However, the most relevant segments in the Spanish aquaculture are:

- Segment 2.2: Trout on growing;
- Segment 3.4: Sea bass and sea bream cages;
- Segment 6.2: Other marine fish on growing;
- Segment 7.1: Mussel rafts.

Figure 5.25.3 Economic performance indicators per segments for Spain: 2010.



SEGMENT 2.2.- Trout on growing

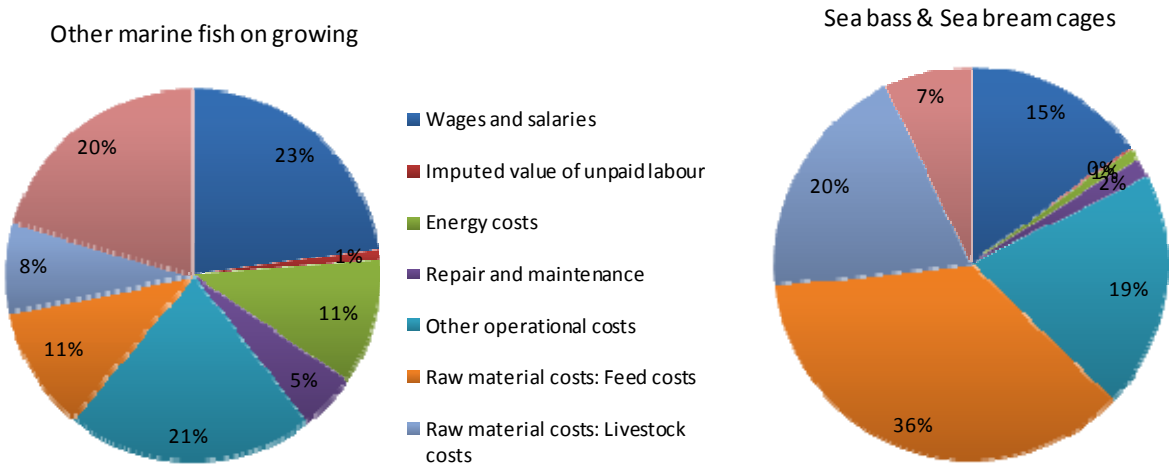
This segment represents most of the freshwater aquaculture in Spain, with the rainbow trout as nearly the only farmed species. There are facilities dedicated to this species in nearly all the Spanish regions.

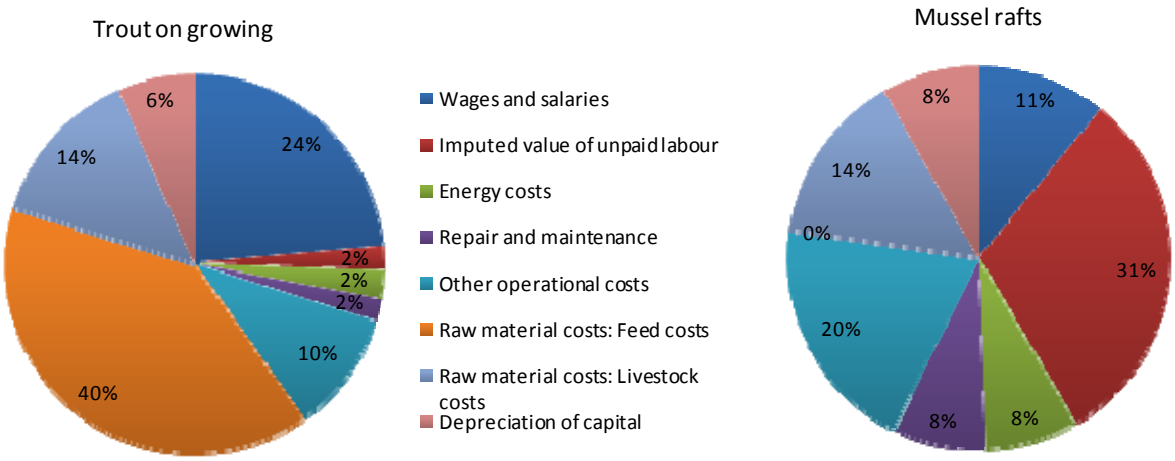
The total income in this segment in 2010 was more than 8 % of the total income of Spanish aquaculture. The industry consists in 64 companies with 319 FTE. But its production has been suffering a decrease during the last decade and the present year goes on with the same trend.

The number of companies involved in trout farming represents a 2 % of Spanish aquaculture companies and the FTE was equivalent to a 5 %.

The running cost indicator to turnover ratio was better than the national average for the aquaculture sector. The calculated GVA was 14.57 million Euros, with an EBIT of 2.9 million Euros, which means an increase of 53 % compared with 2009. Feed is the highest cost, accounting for a 42 % of total operational costs. The operating cash-flow has risen because, in spite of the turnover decreased, it was balanced with an increase in the subsidies.

Figure 5.25.4 Cost structure of main segments for Spain: 2010





SEGMENT 3.4.- Sea bass ¬ Sea bream in cages

The total income in the seabass and sea bream in cages segment was 36 % of the total income in Spanish aquaculture during 2010; this is currently the segment with highest incomes (and highest turnovers) and its contribution to National aquaculture has been increasing in the last three years. It is the sector with the lower level of subsidies in the whole fish farming industry.

It is formed by 41 companies and provided 669 FTE in 2010, which was lower than previous years. The companies in this sector have bigger size than in the rest of the industry, with an average of 16 FTE per firm. Labour productivity in this segment is higher than the average of the total Spanish aquaculture.

The GVA increases a lot comparing with 2009. The costs were similar while the incomes raised. This has a consequence over the EBIT, which is still negative, but improving. The operating cash-flow becomes positive, with a value of 1.36 million Euros. Depreciation in this segment reached by far the highest ratio in the Spanish aquaculture for this value.

SEGMENT 6.2.- Other marine fishes on growing

This segment includes the following species: turbot (*Psetta maxima*), Senegalese sole (*Solea senegalensis*), Common sole (*Solea solea*), meagre (*Argyrosomus regius*). Turbot is the most important species in this segment, due to its production level and the way it has been increasing during the last years. The companies dedicated to these fish have higher dimensions in terms of marketing and production, and a very high intensity in the use of modern technologies.

This segment resulted in more than 11 % of the total industry sales and it stands with 19 companies in 2010. Although the number of firms keeps stable, the FTE number dropped considerably, due to changes of workers among different segments. However, we must stress how this small number of companies generates a high gross added value of the national figure. The indicator labour productivity is much higher than the average data.

Wages and salaries represented 30 % of the operational cost in this segment. As in the previous segment, there is not imputed value for unpaid labour here.

This is a segment that had no losses, with positive indicators and, in general and comparing from previous years, it progresses favourably.

SEGMENT 7.1.- Mussel in rafts

Mussel is the species with the highest volumes of production in Spain, yielding 189.000 tonnes in 2010, and reaching close to a 75 % of the National edible production. It is mostly farmed in rafts in Galicia. We must mention that there are also rafts producing mussels in Mediterranean shore (Catalonia, Valencia and Balearic Islands) but these represent only a 6 % of the national production.

It is a culture highly dependent on climate and other environmental conditions. In particular, the evolution of sales depends on toxic phytoplankton origin episodes which prevent getting the production out of the raft. The incidence of these events impacts directly in the production every year.

The first value calling attention is the high number of productive units, 2,045, which represents a 66 % of the aquaculture facilities in Spain. Another relevant indicator remarking the particularities of the mussel farming industry is the FTE, just 2,276, which is similar to the number of rafts. It reveals a structure composed mostly by self employees rather than corporations. Each of these small units owns less than 2 rafts as an average.

The turnover represented a 16 % of the National amount, a very low figure with such a high production. The subsidies accounted for the 2 % of the total income (a lower percentage comparing with the national average of Spanish aquaculture, although this year the sector has received a higher amount of subsidies than previous years). Anyway, the gross added value is quite high with regard the national figure, but it suffered a decrease from 2009.

This sector has a different cost distribution derived from a completely different farming technique.

First of all, there are no feed costs. But the energy cost is instead very high, 8 %, which doubles the national average, as a result of the fuel used by the auxiliary ships. The other operational costs get 21 %, in a similar level as the national average.

It is remarkable the percentage of the imputed value for unpaid labour (33 % of the total cost). This is a sector where most of the workers are self- employed workers and the production units have familiar structures.

Both GAV and EBIT have decreased with regards to 2009.

5.25.3 Trends and triggers

The growth of aquaculture in recent decades is revealed when half of the total human consumption of seafood comes from aquaculture farming according to recent FAO estimations. This activity should not be understood as alternative to wild capture fisheries, even interactions exist, but as an independent industry providing real business opportunities. The aim of aquaculture is mostly to improve food security, but also includes other potential applications such as supporting scientific research, development of bio-fuels, pharmaceuticals, restocking, ornamentals and jewellery.

Spain is not an exception. Prominent species are gilthead bream, sea bass, rainbow trout and mussels, although the diversity spreads up to several tens. Amberjack, red mullet and octopus are in advanced research phase, but still far from becoming a relevant commercial activity. In the last years, the aquaculture production has been suffering a decreasing trend but increasing in value. However the prospects for recovery are good for 2011 in terms of overall production.

Taking as references the commercial size production in 2009, the production of gilthead bream, rainbow trout and sea bass drops in 2010, although an upward trend is estimated in 2011 for the last one. The supply of turbot grows and the mussel remains reasonably stable, with increased prospects in 2011. The emerging culture of sole and black spot bream presents good expectations, as well as the crustaceans prawn (*Penaeus japonicas*) because it is sold alive, creating a comparative advantage.

Regarding the production of gilthead bream juveniles drops, rising imports from France, Italy and Greece. The rise in sea bass juveniles comes complete with imports. And there is a significant increase of turbot fingerlings, exported mainly to Portugal.

The number of facilities has decreased due to current financial crisis or by the resize of market and enterprises. Employment is also affected showing a downward trend. The aquaculture challenge therefore is its consolidation as sustainable in economic, environmental and social areas, taking advantage of the growing demand for fishery products and the lowering of wild capture fisheries.

Over the years there have been remarkable improvements in techniques of culture, research and development in new species, optimization of feeding methods (i.e. enhance conversion rates, help digest, shorten the growing) and prevention of diseases but there is still way ahead to overcome threats, weaknesses and to confront new challenges.

So the Spanish aquaculture sector must face different risks and disadvantages:

- Competition for the space with other activities.
- Big investments and high costs of production.
- Dependence on import of juveniles (excluding the turbot).
- Obstacles to the supply of raw materials for animal feed.
- The volatility of prices because of the increase in the supply of certain species or by the conflict of prices in the same species with different origins (aquaculture and extractive).
- Unequal social acceptance of the activity opposite to the extractive one.

- The contradiction between the atomization of the sector and the big companies.
- Increasing competition of third countries with less restrictive and costly conditions.
- Delays in administrative procedures that stop entrepreneurial initiative.
- Taxes out of proportion.
- Environmental and administrative limitations for the emplacement of facilities.
- Poor business network (i.e. organization, management, financing).
- Low investment in marketing and promotion of products.
- Handicaps in R&D and new product development: more development than innovation; more basic research than advanced; predominance of the short term over the long one.
- Different interests of administrations (regulation), companies (industrial secret) and investigators (publication).

Also have advantages and opportunities that exploited may increase the profitability and efficiency of the enterprises:

- Growth of demand for aquatic products.
- Productive and diversification capacities (markets, species).
- New markets and variety of presentations.
- Stability in the supply (timing, products, logistic networks).
- Leadership in certain species.
- Good use of the European funds.
- Personnel highly qualified for R&D and big companies with capacity on their own.
- Technological platforms and strategic plans.
- Support of the state and local administrations.
- Development of new technologies.
- Promotion of sustainable and ecological production.

The future of aquaculture in Spain demands especially economic and environmental sustainability, competitiveness and obtaining results in R&D, directly linked to the development of the sector to:

- Focus on species and cost-effective processes.
- Improve the genetic heredity of the stock of breeding organisms.
- Investigate to close productive cycles of new species.
- Make technological improvements that allow optimizing the feed and the sanitary control.
- Change the perception of the product: to approach the consumer with campaigns those consolidate his confidence (properties, quality, marketing, use of new links of massive communication…).

5.25.4 Data coverage and Data Quality

Spain has currently two surveys directed to the aquaculture sector, the Activity Survey and the Economic Survey. Both surveys are developed at the same time, using the same population to research and with a common field work. Each survey has its own questionnaire, getting information for different variables, except the value for the production (collected in both questionnaires). In this case, individual answers are checked and if there are inconsistencies, they are researched and the found mistakes are corrected. So the consistency between both surveys is guaranteed.

Data are collected with combined methods; in a part of the population it is used a census and in another part a stratified sampling is the used method.

The segmentation used in Economic Survey uses a typology of aquaculture establishments which is coherent with the established groups in Commission Decision 2010/93/UE.

Anyway, this proposed stratification does not allow obtaining valid results for the whole population, in those cases in which is used the Probability sample survey and ask certain breakdowns, as in the following cases:

Turnover and Income. “For species”: Each segment collects large groups of species (i.e. trout, sea bream, sea bass, common carp). Companies can belong to only one segment. However, they can grow and produce other different species. The random sample selection takes into account just the main specie (in volume). The stratums are not always representative of the species that are grown or produced. For this reason, there can be a bias when you raise the sample results to the whole population.

Total sales volume: In addition, in the template the volume must be measured in tonnes. The production for human consumption is measured in tonnes; however, different stages in life cycle (eggs or juveniles) are measured in quantities. It is really difficult to estimate a conversion factor between quantities to tonnes, because each establishment produces different size juveniles depending on the demand. That is the main reason, Spain has not provided data in DCF, because the end user can interpret the figure given in tonnes as the only production related with the total incomes provided. And this income is due to this production plus another

production measured in quantities. May be the inclusion of a column to put the numbers of juveniles could solve this problem and avoid the lack of this information.

Raw material volume: Feed: There is some data for feed collected in litres (i.e. feed used in mollusc hatcheries and nurseries).

5.26 SWEDEN

5.26.1 Overview of the sector

The Swedish fishery sector including the fleet, aquaculture and processing industries employs around 4,000 individuals and represent 0.1 % of GDP. Aquaculture is also small in relation to the total Swedish fishery industry. Of the total production of fish for consumption, aquaculture represents around 3-4 % of the total volume, but around 25 % of the value of production.

Sweden has favourable natural prerequisites for aquaculture with a large number of appropriate freshwater areas. Firms are located in 100 out of Sweden's 290 municipalities and a majority of firms are sited in rural municipalities. Over the last decade, production levels have been steadily increasing while the number of firms have decreased. Over the years 1998 to 2010 production levels have increased from 5,500 tonnes in 1998 to 11,723 tonnes in 2010 and the value of total production have increased from 14.5 million Euros in 1998 to 41 million Euros in 2010. During the same period, there have been a decline in both the number of firms and the number of employees, indicating clustering of smaller firms to larger units. The industry consists of four main segments: three segments with freshwater species and one segment with mussels, oysters and crayfish, almost entirely marine species.

There are large variations in production levels across segments. Rainbow trout and arctic char grown in cages represent the largest segment in terms of both weight and value of production. In 2010, the segment produced 80% of total production volumes comprising 74 % of aggregate total incomes within aquaculture. Growing of mussels and crayfish is the smallest segment in terms of total incomes, comprising 3 % of aggregated total incomes.

In 2010, there were 175 firms with aquaculture production as their main activity (more than 50 %).Compared to 2009, the number of firms decrease by 9 % (Table 5.26.1). Firms within the sector are small in terms of employees. In 2010, 98 % of the firms were small and medium sized, out of which 92% were micro-firms with less than five employees. Between 2009 and 2010 the number of micro-firms reduced by 11% while the number of firms with 6-10 employees increased by 45 % (firms with more than 10 employees remaining constant).

The total number of employees within the aquaculture sector is 399 in 2010 and the sector is dominated by male workers (89 %). Compared to 2009, total employment has decreased by 6 %, recalculated into full time and full year employment (FTE) shows an increase in the number of employees by 4 %. Male FTE increased by 4% while female FTE dropped by 5 %.

In 2010, the total volume of aquaculture production in Sweden was 11.7 thousand tonnes indicating an increase by 13% from previous year, both livestock and feed inputs increased with 26 % respectively.

Performance indicators shows that FTE/enterprise increased from 1.2 to 1.3 between from 2009 to 2010, indicating an increase in the number of full-time full-year employees for firms in the sector. At the same time the indicators shows progress in both wage levels and productivity, implying an increase in the average salary an employee working full time is receiving and an increase in the value added to the economy by such, graphically presented in Figures 5.26.1 and 5.26.2.

Table 5.26.1 Sector overview for Sweden: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*155*	*192*	*175*	*-9%*
<= 5 employess	142	182	162	-11%
6-10 employess	9	7	10	43%
> 10 employees	4	3	3	0%
Employment (number)				
Total employees	*379*	*424*	*399*	*-6%*
Male employees	321	367	356	-3%
Female employees	58	57	43	-25%
FTE	*223*	*222*	*230*	*4%*
Male FTE	199	201	209	4%
Female FTE	24	22	21	-5%
Input & Production (thousand tonnes)				
Raw material volume: Feed	14.2	13.1	16.5	26%
Raw material volume: Livestock	0.9	0.8	1.0	26%
Production volume	8.9	10.4	11.7	13%
Indicators				
FTE per enterprices	1.4	1.2	1.3	13%
Average wage (thousand €)	29.0	24.4	28.6	17%
Labour productivity (thousand €)	48.9	39.2	52.1	33%

Figure 5.26.1 Sweden employment trends: 2008-2010.

Figure 5.26.2 Sweden income, wage and labour productivity trend: 2008-2010.

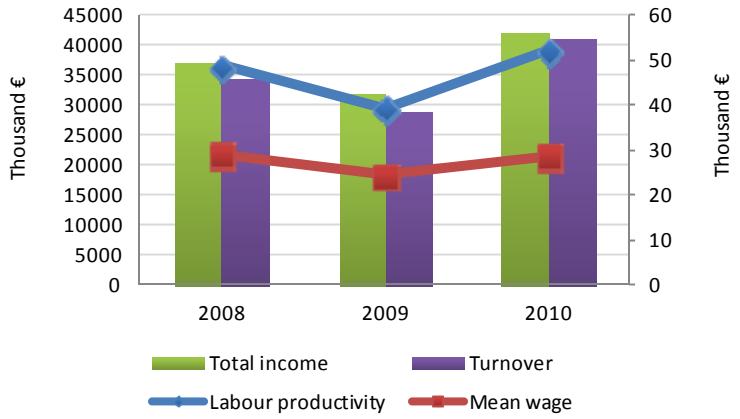


Table 5.26.2 shows the structure of incomes, costs and economic performance for aquaculture firms over the years 2008 to 2010.

Figures presented in the table shows that turnover is the key source of income, in 2010 its share of total income is near 100 %. For 2008 and 2009 turnovers share of total income is only slightly lower. Turnover dropped between the years 2008 to 2009 from 34.5 to 29.5 million Euros. Considering the steady increase in production volumes, indicates a drop in prices, most likely related to financial instability witnessed in most countries during this period of time. Between the years 2009 to 2010 turnover recovered and reached its highest level up to this point (from 29.4 million Euros in 2009 to 41.2 million in 2010).

Both subsidies and other income are small shares of total income. Subsidies share of total income is around 2-3 %, and defines as the total amount of finalized subsidies to aquaculture firms from the European fisheries fund (EFF). Since granted applications are not included in this variable and the program had a late start no subsidies were finalized and paid out during 2008. The total amount of EFF subsidies paid out to aquaculture farmers increased by 2 % from 2009 to 2010, a real increase of 14,100 Euros.

The cost structure shows that the main operational expenditures for aquaculture firms are the costs of raw material (feed and livestock) and the cost of labour (wages and salaries). In 2009, firms spent a total of 12.2 million Euros on fodder, 5.2 million on labour inputs and 3.4 million on livestock. Both energy cost and imputed value of unpaid labour makes out a small share of operational expenditures, 4 and 1 % respectively. Depreciation of capital shows an increased with 2 % over the years 2009 to 2010, indicate a decline in asset value. Cost structures for individual segments show large differences. Feed costs are largest for freshwater segments and zero for shellfish farming (cost structures for individual segments are presented in Figure 5.26.3.).

The performance measures shown in the table indicates progress between 2009 and 2010 in terms of gross value added (+38 %) and return on investment (increasing from 6 to 9 %). Capital productivity, calculated as the average output per unit of capital, remained fairly constant. Performance measures shown in Table 5.26.2 are aggregate values and more or less reflects a progress in the dominating sector (freshwater fish grown in cages). There are large variations across segments and two segments are suffering from decreases in income, productivity and production, in particularly trout grown in cages.

Table 5.26.2 Economic performance for Sweden: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	34.5	92%	29.4	92%	41.2	98%	40%
Other income	2.9	8%	1.6	5%	0.2	1%	-86%
Subsidies	0.0	0%	0.8	3%	0.8	2%	2%
Total income	*37.4*	*100%*	*31.8*	*100%*	*42.2*	*100%*	*33%*
Expenditure (million €)							
Wages and salaries	6.2	17%	5.2	16%	6.4	15%	22%
Imputed value of unpaid labour	0.3	1%	0.2	1%	0.2	1%	0%
Energy costs	1.6	4%	1.3	4%	1.3	3%	1%
Repair and maintenance	1.4	4%	1.2	4%	1.6	4%	38%
Raw material costs: Feed costs	14.4	38%	12.2	38%	17.0	40%	39%
Raw material costs: Livestock costs	4.1	11%	3.4	11%	4.3	10%	25%
Other operational costs	5.1	14%	4.3	13%	5.3	13%	25%
Total operating costs	*32.9*	*88%*	*27.7*	*87%*	*36.0*	*85%*	*30%*
Capital Costs (million €)							
Depreciation of capital	1.8	5%	1.8	6%	1.8	4%	2%
Financial costs, net	0.7	2%	0.6	2%	0.4	1%	-36%
Extraordinary costs, net	0.1	0%	0.1	0%	0.1	0%	18%
Capital value (million €)							
Total value of assets	46.5	124%	34.9	110%	48.6	115%	39%
Net Investments	4.1	11%	5.0	16%	4.9	12%	-3%
Debt	18.3	49%	17.2	54%	22.5	53%	31%
Performance Indicators (million €)							
Gross Value Added	10.9	29%	8.7	27%	12.0	28%	38%
Operating Cash Flow	4.4	12%	4.1	13%	6.2	15%	51%
Earning before Interest and Tax	2.6	7%	2.3	7%	4.4	10%	90%
Net Profit	1.9	5%	1.7	5%	4.0	9%	139%
Capital Productivity	23.5		25.0		24.7		
Return on Investments (%)	5.7		6.6		9.0		
Financial position (%)	60.7		50.8		53.6		
Future Expectation Indicator (%)	5.0		9.2		6.3		

5.26.2 Structure and economic performance of the sector's main segments

The largest segment in terms of both value and weight of production is freshwater fish grown in cages. Species included in this segment are arctic char (*Salvelinus alpinus*) and rainbow trout (*Oncorhynchus mykiss*). In 2010, the segment produced 80 % (9,405 tonnes) of total aquaculture production in Sweden and its turnover accounted for 75 % of total turnover. In 2010, there were 63 firms in this segment producing an average volume of 149 tonnes per firm. Compared to 2009, the number of firms in this segment remained unchanged while the average production volume per firm increased by 44 tonnes. Performance indicators show that, compared to 2009, the segment has experienced progress. All indicators show a recovery from year 2009 with positive changes in income (60 %), productivity, profitability and production volume (42 %). Rainbow trout and arctic char farming are large and emerging industries in many of the Nordic countries and increases in production volumes are to a large extent explained by high market demand, favourable prices and good export opportunities. Economic indicators for this segment are graphically presented in Figure 5.26.2.

The second largest segment in terms of production value is freshwater species on growing. Dominating species in this segment are arctic char (*Salvelinus alpinus*) and rainbow trout (*Oncorhynchus mykiss*). In 2010, the segment produced 6 % (708 tonnes) of total production and its turnover accounted for 19 % of total turnover. In 2010, there were 53 firms in this segment producing an average volume of 13 tonnes per firm. Compared to 2009, the number of firms in this segment has decreased by one and the average production volume has increased by 12 tonnes. Economic indicators shows that the segment has experienced progress in terms of both total income and profitability. Earnings before interest and taxes (EBIT) or operating profit have increased by 64 % reflecting an increase in profitability (excluding interest and income tax expenses). Indicators shows a decline in both productivity and production volume. Freshwater segments (the two main segments) received the largest share of subsidies during 2010 (68 %). Economic indicators for this segment are graphically presented in Figure 5.26.2.

The third largest segment in terms of production value is trout on growing. In 2010, the segment produced 2 % (225 tonnes) of total production and its turnover accounted for 3 % of total turnover. In 2010, there were 22 firms in this segment producing an average volume of 10 tonnes per firm. Compared to 2009, the number of firms in this segment has increased by 5 while the average production volume per firm has remained constant. Economic indicators shows that the segment has experienced a downfall in all of the indicators. Economic indicators for this segment are graphically presented in Figure 5.26.2.

The smallest segment consist of firms growing mussels (*Mytilus edulis*), oysters (*Ostrea edulis*) and crayfish (*Pacifastacus leniusculus*). In 2010, there were 37 firms in this segment, 4 firms were farming mussels and oysters as their main activity and 33 firms crayfish. In 2010, the total production volume was 12 % (1,384 tonnes) out of total aquaculture production in Sweden and turnover accounted for 2 % of total turnover. Production volumes in this segment mainly consist of volumes of mussels and oysters (around 99 %). Firms that grow mussels and oysters are few and average firm production is high, whereas the number of firms in crayfishing is relatively high and average production volumes are low (0.007 tonnes). Compared to 2009, the number of firms in this segment has been reduced by 11 firms, mainly a reduction of firms that have crayfish as their main activity (-9) but also a significant reduction in the number of firms producing mussels (-2). Performance indicators show a decline in income, productivity, profitability and volume of production. There is a large variation in the production of mussels from year to year due to periodic/seasonal breaks in the production which could provide part of the explanation to the drop all of the performance indicators. It is also difficult to get accurate figures for crayfish production. There are few firms in this segment and the changes and actions taken by one single firm will be reflected in the aggregate values for the segment. The negative change could therefore be due to both methodological issues or short run changes in production levels. In 2009, 83 % of all

subsidies were allocated to this segment. Economic indicators for this segment are graphically presented in Figure 5.26.2.

Table 5.26.3 Economic performance for Sweden at segment level: 2008-2010.

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% change 2009 -2010
Other freshwater fish cages							
Total Income (million €)	23.1	100%	19.4	100%	31.1	100%	60%
Gross Value Added (million €)	5.8	25%	4.6	24%	8.4	27%	81%
Operating Cash Flow (million €)	2.3	10%	1.6	8%	3.8	12%	137%
Earning before Investments & tax (million €)	1.3	6%	1.0	5%	2.5	8%	154%
Net Profit (million €)	1.1	5%	0.6	3%	2.2	7%	290%
Volume of sales (thousand tonnes)	5.8		6.6		9.4		42%
Other freshwater fish on growing							
Total Income (million €)	4.7	100%	8.3	100%	8.5	100%	2%
Gross Value Added (million €)	1.4	29%	2.9	34%	2.7	32%	-4%
Operating Cash Flow (million €)	0.5	10%	1.5	18%	1.9	22%	25%
Earning before Investments & tax (million €)	0.2	4%	0.9	11%	1.5	18%	64%
Net Profit (million €)	0.0	1%	0.8	10%	1.4	16%	71%
Volume of sales (thousand tonnes)	0.5		1.4		0.7		-48%
Other shellfish Other							
Total Income (million €)			1.9	100%	1.1	100%	-44%
Gross Value Added (million €)			0.6	30%	0.4	42%	-20%
Operating Cash Flow (million €)			0.7	36%	0.3	28%	-55%
Earning before Investments & tax (million €)			0.1	6%	0.2	18%	54%
Net Profit (million €)			0.0	1%	0.2	17%	1551%
Volume of sales (thousand tonnes)			2.1		1.4		-35%
Trout on growing							
Total Income (million €)			2.2	100%	1.6	100%	-29%
Gross Value Added (million €)			0.7	32%	0.5	30%	-33%
Operating Cash Flow (million €)			0.3	15%	0.3	17%	-21%
Earning before Investments & tax (million €)			0.3	13%	0.2	14%	-22%
Net Profit (million €)			0.3	12%	0.2	14%	-22%
Volume of sales (thousand tonnes)					0.2		

Figure 5.26.3 Economic performance indicators per segments for Sweden: 2010.

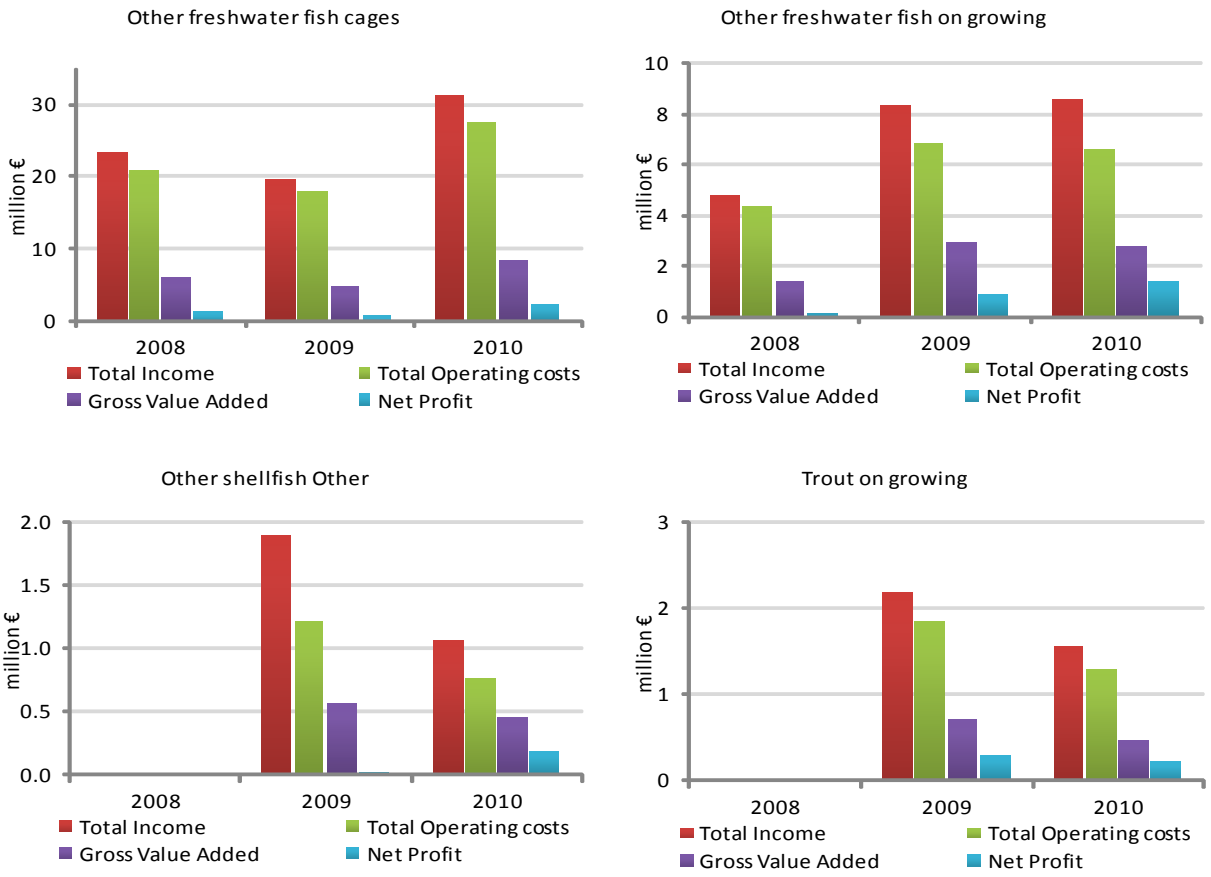
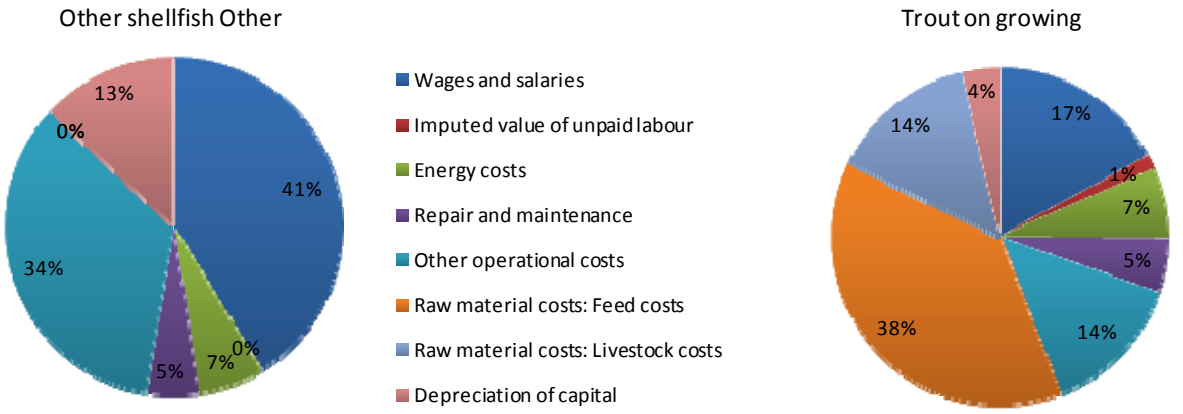


Figure 5.26.4 Cost structure of main segments for Sweden: 2010



5.26.3 Trends and triggers

Aquaculture in Sweden has a large potential for further development with regards to sustainable production techniques. Several research institutes and projects focus on the development of new growing techniques, fodder development, reducing nitrogen emissions, phosphorus emissions etc. The problem for the sector, as in many other countries are related to difficulties in the implementation of new techniques and stringent regulation. In Sweden, as in most EU countries this has been pointed out as one of several important obstacles for growth in production volumes.

One important focus of the new fisheries fund (EHFF) is to develop European aquaculture to achieve sustainable growth in production volumes, improved competitiveness and profitability, among other things. The Swedish Operational Programme will give priority to measures increasing profitability, new production techniques, new techniques that reduce the environmental impact and measures in the field of preventing damage caused by wild predators. There will also be a large focus on measures to support investments in the forming and adapting firms to use sustainable production methods, for example recirculating and aquaponic systems.

Furthermore, growing mussels (for the use of organic fertilizer or as organic fodder) on the basis of environmental concerns, and aquaculture zoning are also a part of the new fund (EHFF) and will be given priority in the national program.

There are also some incentives for new developments in the aquaculture sector in the framework of the current European Fisheries Fund (EFF). The Swedish Operational Programme gives priority to measures increasing profitability, new production techniques, new techniques that reduce the environmental impact and measures in the field of preventing damage caused by wild predators (seals etc.). In the current fund, a majority of applications concern increased production of freshwater species such as rainbow trout, arctic char and blue mussels.

5.26.4 Data coverage and Data Quality

Since 2011, the Swedish Board of Agriculture is responsible for compiling and reporting statistics on the aquaculture sector for the reported period. The Swedish Board of Agriculture in cooperation with Statistics Sweden conducted two questionnaires and a tax declaration survey for each year.

Data was collected by Statistics Sweden in several ways. First, income tax declarations from every enterprise whose main source of income (more than 50 %) came from aquaculture was compiled (EUROSTAT definition under NACE Code 03.2 Fish farming). A questionnaire concerning farming techniques, investments, production value and volume was sent to all aquaculture farms.

The purpose of this survey was to provide additional information in order to enable a clustering of farming units to enterprises in cases when several farming units are equal to one fiscal enterprise. This method also makes it possible to compare information on value of aquaculture production with declared income from income tax declarations. These comparisons are needed to determine whether aquaculture farming is the main activity of the enterprise or not. Secondly, a questionnaire was sent to a sample of the aquaculture enterprises in order to create a cost allocation key for costs that are not specified in the income tax declaration. This is a non-probability survey.

Data on subsidies was collected from The Swedish Board of Agriculture, since 2011 the managing authority of the European Fisheries Fund (EFF), and compiled by Statistics Sweden. Lastly, in order to identify the segments, companies using more than one farming technique or growing more than one species, all production, incomes and costs were transferred to the main technique and main species based on turnover. Data on aquaculture production is reported from the Swedish official statistics to Eurostat. Hence, the volume of production as reported by Eurostat should coincide with volumes reported in Swedish official statistics. However, disparities can occur due to updates in the data mainly due to changes in the number of active enterprises.

5.27 UNITED KINGDOM

5.27.1 Overview of the sector

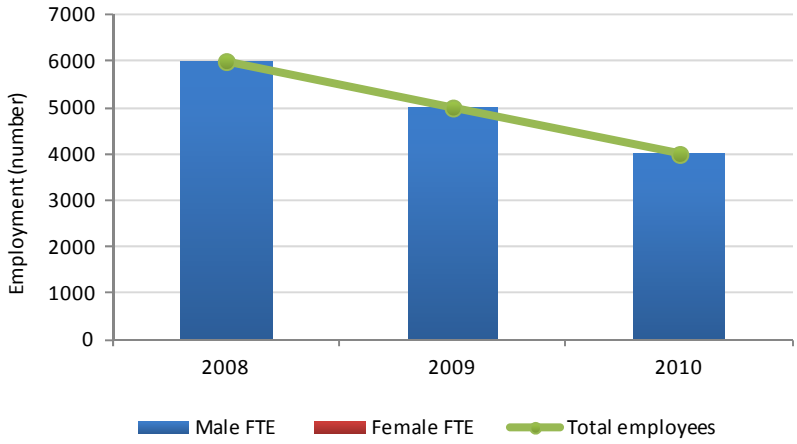
The variability in turnover with an apparent recovery to more than 640 million Euros in 2010 compared to the previous year is largely attributable to price changes for the aquaculture products compounded by fluctuations in the dollar/pound exchange rate. Production levels by volume were fairly constant at 197,000 tonnes in 2009 and 201,000 tonnes in 2010. Although no figures are available for total exports of farmed products, salmon forms the greatest part of British aquaculture production and the bulk of salmon exports go to the USA. Hence the $/£ exchange rate is important to sector earnings. There was a 15 % fall in the average annual spot $/£ exchange rate between 2008 and 2009 and almost no change between 2009 and 2010. This tends to confirm the picture of stability in the face of difficult economic conditions.

While the number of enterprises declined, there was consolidation among firms employing fewer than 10 staff and a reduction in the total numbers of staff employed reflecting a response to the economic climate but there was an increase of some 57 % in the average wage and an even sharper increase in labour productivity (+77 %). Some care should be taken with the employment data as the survey operates at too aggregated a level to capture accurately changes in aquaculture.

Table 5.27.1 Sector overview for United Kingdom: 2008-2010.

	2008	2009	2010	% change 2009-2010
Structure (number)				
Total enterprises	*531*	*442*	*428*	*-3%*
<= 5 employess	431	322	321	0%
6-10 employess	55	70	63	-10%
> 10 employees	45	50	44	-12%
Employment (number)				
Total employees	*6000*	*5000*	*4000*	*-20%*
Male employees	6000	5000	4000	-20%
Female employees	0	0	0	
FTE	*6000*	*5000*	*4000*	*-20%*
Male FTE	6000	5000	4000	-20%
Female FTE	0	0	0	
Input & Production (thousand tonnes)				
Raw material volume: Feed				
Raw material volume: Livestock				
Production volume				
Indicators				
FTE per enterprices	11.3	11.3	9.4	-17%
Average wage (thousand €)	11.3	11.6	18.3	57%
Labour productivity (thousand €)	32.7	25.0	44.3	77%

Figure 5.27.1 United Kingdom employment trends: 2008-2010.



The increase in turnover is mirrored by a 40 % increase in operating costs, but the 26 % increase in labour costs reflects the decline in employment.

The figures reported here have been given as wholly male because no gender breakdown is available. Based upon the Scottish shellfish industry for which a figure is published recording that 18 % of employment is female (Scottish Shellfish Farm Production Survey 2010), we suggest that figure might be used to impute the gender breakdown for the industry.

Table 5.27.2 Economic performance for United Kingdom: 2008-2010 .

	2008	As % of total income	2009	As % of total income	2010	As % of total income	% Change 2009-2010
Income (million €)							
Turnover	646.0	100%	457.0	100%	643.0	100%	41%
Other income	0.0	0%	0.0	0%	0.0	0%	
Subsidies	0.0	0%	0.0	0%	0.0	0%	
Total income	*646.0*	*100%*	*457.0*	*100%*	*643.0*	*100%*	*41%*
Expenditure (million €)							
Wages and salaries	68.0	11%	58.0	13%	73.0	11%	26%
Imputed value of unpaid labour	0.0	0%					
Energy costs							
Repair and maintenance							
Raw material costs: Feed costs							
Raw material costs: Livestock costs							
Other operational costs	450.0	70%	332.0	73%	466.0	72%	40%
Total operating costs	*518.0*	*80%*	*390.0*	*85%*	*539.0*	*84%*	*38%*
Capital Costs (million €)							
Depreciation of capital							
Financial costs, net							
Extraordinary costs, net							
Capital value (million €)							
Total value of assets	286.0	44%	182.0	40%	255.0	40%	40%
Net Investments							
Debt							
Performance Indicators (million €)							
Gross Value Added	196.0	30%	125.0	27%	177.0	28%	42%
Operating Cash Flow	128.0	20%	67.0	15%	104.0	16%	55%
Earning before Interest and Tax							
Net Profit							
Capital Productivity	68.5		68.7		69.4		
Return on Investments (%)							
Financial position (%)							
Future Expectation Indicator (%)							

5.27.2 Structure and economic performance of the sector's main segments

Economic indicators are not available by sector but, as noted in the previous report (EWG-11-14), UK aquaculture is dominated by cage salmon production, followed by trout (rainbow and brown combined), then mussels, with all other sectors adding up to less than 2 % by either volume or value. The great majority of trout is grown in fresh water, with a small proportion grown to table size in seawater cages, so inclusion in DCF returns is voluntary.

Comparison over time is complicated by fluctuations in exchange rates and a simpler national picture is obtained by comparing volumes and live weight values in GBP. This illuminates the drop in unit price between 2008 and 2009 and recovery in 2010.

Table 5.27.3 Production of the main species by weight and value for United Kingdom: 2008-2010 .

	production volume (thousand tonnes)		
	2008	2009	2010
Species			
Salmon	129	145	155
Trout	13	16	14
Mussels	28	32	30
All others	5	4	2
Total	175	197	201

	production value (million GBP)		
	2008	2009	2010
Species			
Salmon	438	414	442
Trout	39	38	35
Mussels	28	22	21
All others	12	9	9
Total	517	483	507

This shows steady growth in salmon production but no trends in trout or mussels. The Scottish salmon industry has over the past two decades undergone a process of consolidation of ownership and increased productivity through capital investment and automation. It is a reasonable assumption that the financial economic indicators

as UK national totals obtained through the Annual Business Survey (ABS) reflect the situation in this sector better than the situations in trout or mussel sectors.

Employment within the Scottish salmon sector is reported by the Scottish Government (Scottish Fish Farm Production Survey 2010), and the numbers of staff for 2008, 2009 and 2010 are 949, 963 and 1064 respectively. These should be put in context against 1397 in 2001 declining to 871 in 2006, so continue a trend of recovery in jobs.

National employment costs for aquaculture, estimated in the ABS as 63 million pounds, represent 11 % of turnover. EAPI (Hofherr et al. 2012, appendix 4.2) indicators estimate production costs excluding labour for salmon as 77 % of turnover, so labour costs of 11% leaves a profit. EAPI estimate production costs for trout as 69 % of turnover and for mussels as 47 % of turnover, and these sectors would have higher labour costs as they are less automated. Based on data from last's year report, labour costs could be 8.1 %, 16.4 % and 25.2 % for salmon, trout mussels, so a weighted average of 11 % is consistent.

Using the percentages for costs from the EAPI table it would be possible to impute the DCF indicators for the UK sectors, and the evidence is that the imputed figures would be consistent with industry-based returns.

5.27.3 Trends and Triggers

New legislation in the UK and Scottish parliaments provides a framework to manage growing and competing demands for the use of marine resources balancing environmental and socio-economic considerations. Marine aquaculture is thus encouraged but constrained to pursue sustainable practices and develop accordingly. There appears every reason to believe that UK production of salmon will continue to increase with healthy domestic and export markets. It is expected that mussel farming will extend to meet an increased catering demand. Growth in the trout sub-sector is currently being held back by the limited sites available, and oysters have been affected in recent years by disease but the market appears only to have significant development opportunities through increased exports.

5.27.4 Data Coverage and Data Quality

STECF in its report (EWG-11-14) commented that the UK "did not provide a complete set of economic indicators". This continues to be the case because it is UK government policy not to impose additional burdens of data reporting on industries. The available data comprises production volumes collected through a census process undertaken as part of statutory health surveillance visits to farms. Other totals for economic indicators are estimated by a separate process drawn from a sample survey covering all industries (ONS Annual Business Survey). This reports on aquaculture as a sector but does not distinguish between production methods.

Agreement between the census values and raised values from the sample surveys is good at plus or minus 10 %.

6 GLOSSARY

The economic variables to be collected for the aquaculture industry sector under the Data Collection are specified in section A of the Chapter IV and in Appendix XII of Commission Decision 2008/949/EC of the 6th of November 2008, on Adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy.

Table 6.1 List of economic variables for the aquaculture sector

Variable group	Variable	Unit
Income	Turnover	EUR
	Subsidies	EUR
	Other income	EUR
Personnel costs	Wages and salaries	EUR
	Imputed value of unpaid labour	EUR
Energy costs	Energy costs	EUR
Raw material costs	Livestock costs	EUR
	Feed costs	EUR
Repair and maintenance costs	Repair and maintenance	EUR
Other operational costs	Other operational costs	EUR
Capital costs	Depreciation of capital	EUR
	Financial costs, net	EUR
Extraordinary costs, net	Extraordinary costs, net	EUR
Capital value	Total value of assets	EUR
Net Investments	Net Investments	EUR
Debt	Debt	EUR
Raw material volume	Livestock	Tonne
	Fish feed	Tonne
Volume of sales	Volume of sales	Tonne
Employment	Number of persons employed	Number
	FTE National	Number
Number of enterprises	Number of enterprises	Number

6.1 Glossary of data requested and indicators

6.1.1 *Parameters requested*

Turnover:

"Turnover" comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties.

Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover.

It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices, rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extraordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded (Structural Business Statistics (SBS) Code 12 11 0, Commission Regulation (EC) No 2700/98).

Subsidies:

"Subsidies" are the financial assistance received from public authorities or the institutions of the European Union which are excluded from turnover.

It includes direct payments, e.g. compensation for stopping trading, refunds of fuel duties or similar lump sum compensation payments; excludes social benefit payments and indirect subsidies, e.g. reduced duty on inputs such as fuel or investment subsidies.

Other income:

"Other income" refers to other operating income included in company accounts which are excluded from turnover; income coming from other activities than aquaculture, e.g. the licensing of ponds for recreational fishery purposes.

Wages and salaries:

"Wages and salaries" is equivalent to "Personnel costs" on the Structural Business Statistics.

"Personnel costs" are defined as the total remuneration, in cash or in kind, payable by an employer to an employee (regular and temporary employees as well as home workers) in return for work done by the latter during the reference period. Personnel costs also include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions.

Personnel costs are made up of:

- wages and salaries

- employers' social security costs

All remuneration paid during the reference period is included, regardless of whether it is paid on the basis of working time, output or piecework, and whether it is paid regularly or not. Included are all gratuities, workplace and performance bonuses, ex gratia payments, thirteenth month pay (and similar fixed bonuses), payments made to employees in consideration of dismissal, lodging, transport, cost of living and family allowances, commissions, attendance fees, overtime, night work etc. as well as taxes, social security contributions and other amounts owed by the employees and retained at source by the employers. Also included are the social security costs for the employer. These include employer's social security contributions to schemes for retirement pensions, sickness, maternity, disability, unemployment, occupational accidents and diseases, family allowances as well as other schemes. These costs are included regardless of whether they are statutory, collectively agreed, contractual or voluntary in nature. Payments for agency workers are not included in personnel costs. (Structural Business Statistics (SBS) Code 13 31 0, Commission Regulation (EC) No 2700/98).

Wages and salaries: Wages and salaries are defined as "the total remuneration, in cash or in kind, payable to all persons counted on the payroll (including homeworkers), in return for work done during the accounting period." regardless of whether it is paid on the basis of working time, output or piecework and whether it is paid regularly or not. Wages and salaries include the values of any social contributions, income taxes, etc. payable by the employee even if they are actually withheld by the employer and paid directly to social insurance schemes, tax authorities, etc. on behalf of the employee. Wages and salaries do not include social contributions payable by the employer. Wages and salaries include: all gratuities, bonuses, ex gratia payments, "thirteenth month payments", severance payments, lodging, transport, cost-of-living, and family allowances, tips, commission, attendance fees, etc. received by employees, as well as taxes, social security contributions and other amounts payable by employees and withheld at source by the employer. Wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity leave or short-time working may be recorded here or under social security costs, depending upon the unit's accounting practices. Payments for agency workers are not included in wages and salaries. (Structural Business Statistics (SBS) Code 13 32 0, Commission Regulation (EC) No 2700/98).

Social security costs: Employers' social security costs correspond to an amount equal to the value of the social contributions incurred by employers in order to secure for their employees the entitlement to social benefits. Social security costs for the employer include the employer's social security contributions to schemes for retirement pensions, sickness, maternity, disability, unemployment, occupational accidents and diseases, family allowances as well as other schemes. Included are the costs for all employees including homeworkers and apprentices. Charges are included for all schemes, regardless of whether they are statutory, collectively agreed, contractual or voluntary in nature. Wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity leave or short-time working may be recorded here or under wages and salaries, dependent upon the unit's accounting practices. (Structural Business Statistics (SBS) Code 13 33 0, Commission Regulation (EC) No 2700/98).

Imputed value of unpaid labour:

Unpaid workers normally refers to persons who live with the proprietor of the unit and work regularly for the unit, but do not have a contract of service and do not receive a fixed sum for the work they perform. This is limited to persons who are not included on the payroll of another unit as their principal occupation.

Thus, imputed value of unpaid labour estimates the value of the salaries that these unpaid workers would have received if their work was remunerated.

The chosen methodology to estimate this imputed value of unpaid labour should be explained by the Member State in their national programme.

Energy costs:

"Energy costs" corresponds to the "Purchases of energy products (in value)" on the Structural Business Statistics.

Purchases of all energy products during the reference period should be included in this variable only if they are purchased to be used as fuel. Energy products purchased as a raw material or for resale without transformation should be excluded. This figure should be given in value only. (Structural Business Statistics (SBS) Code 20 11 0, Commission Regulation (EC) No 2700/98).

Livestock costs:

Livestock costs considers the purchasing costs of the livestock during the reference period. The variable for livestock costs should correspond to the variable for livestock volume.

On the Structural Business Statistics it is included inside 13 11 0 "Total purchases of goods and services".

Feed costs:

Feed costs considers the purchasing costs of the feed during the reference period. The variable for feed costs should correspond to the variable feed volume.

On the Structural Business Statistics it is included inside 13 11 0 "Total purchases of goods and services".

Repair and maintenance:

Under repair and maintenance there should be included the costs incurred to bring an asset back to its earlier condition or to keep the asset operating at its present condition (as opposed to improving the asset).

On the Structural Business Statistics is included inside 13 11 0 "Total purchases of goods and services".

Other operational costs:

Other operating costs should comprise outsourcing costs, property or equipment rental charges, the cost of raw materials and supplies that cannot be held in the inventory and have not been already specified (i.e. water, small items of equipment, administrative supplies, etc.), insurance premiums, studies and research costs, external personnel charges, fees payable to intermediaries and professional expenses, advertising costs, transportation chages, travel expenses, the costs of meetings and receptions, postal charges, bank charges (but not interest on bank loans) and other items of expenditure.

On the Structural Business Statistics is included inside 13 11 0 "Total purchases of goods and services".

Depreciation of capital:

Depreciation refers to the decline in value of the assets. In accounting, it is used as the allocation of the cost of tangible assets to periods in which the assets are used, in order to reflect this decline in their value.

The chosen methodology to allocate these costs over periods should be explained in the national programme. ESA (6) 6.02 to 6.05 European System of Accounts 1995 (Regulation (EC) No 2223/96, Regulation (EC) No 1267/2003, Eurostat ESA 1995 manual).

Financial costs, net:

"Financial costs, net" includes the Income, coming from financial activity of the enterprise, minus the financial costs.

Extraordinary costs, net:

"Extraordinary costs, net" is the difference between "Extraordinary income" and "Extraordinary charges".

"Extraordinary income" and "Extraordinary charges" are the income and costs that arise otherwise than in the course of the company's ordinary activities (Article 29 of the Fourth Council Directive 78/660/EEC of 25 July 1978).

Total value of assets:

This parameter corresponds to the Balance sheet total of the Structural Business Statistics and the Capital value in the European System of Accounts.

Balance sheet total consists of the sum of items 1 to 16 of the asset side of the balance sheet or of the sum of items 1 to 14 of the liability side of the balance sheet. (Structural Business Statistics (SBS) Code 43 30 0, Commission Regulation (EC) No 2700/98).

Capital value is the total accumulated value of all net investments in the enterprise at the end of the year. ESA 7.09 to 7.24 European System of Accounts 1995 (Regulation (EC) No 2223/96, Regulation (EC) No 1267/2003, Eurostat ESA 1995 manual).

Net Investments:

"Net investments" refers to the difference between Purchase (Gross investment in tangible goods) and Sale (Sales of tangible investment goods) of assets during the year.

Gross investment in tangible goods is the Investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. Capitalised production of tangible capital goods), having a useful life of more than one year including non-produced tangible goods such as land. The threshold for the useful life of a good that can be capitalised may be increased according to company accounting practices where these practices require a greater expected useful life than the one year threshold indicated above.

All investments are valued prior to (i.e. gross of) value adjustments, and before the deduction of income from disposals. Purchased goods are valued at purchase price, i.e. transport and installation charges, fees, taxes and other costs of ownership transfer are included.

Own produced tangible goods are valued at production cost. Goods acquired through restructurations (such as mergers, take-overs, break-ups, split-off) are excluded. Purchases of small tools which are not capitalised are included under current expenditure. Also included are all additions, alterations, improvements and renovations which prolong the service life or increase the productive capacity of capital goods. Current maintenance costs are excluded as is the value and current expenditure on capital goods used under rental and lease contracts. Investment in intangible and financial assets are excluded. Concerning the recording of investments where the invoicing, delivery, payment and first use of the good may take place in different reference periods, the following method is proposed as an objective:

Investments are recorded when the ownership is transferred to the unit that intends to use them. Capitalised production is recorded when produced. Concerning the recording of investments made in identifiable stages, each part-investment should be recorded in the reference period in which they are made.

In practice this may not be possible and company accounting conventions may mean that the following approximations to this method need to be used:

i) investments are recorded in the reference period in which they are delivered,

ii) investments are recorded in the reference period in which they enter into the production process,

iii) investments are recorded in the reference period in which they are invoiced,

iv) investments are recorded in the reference period in which they are paid for.

Gross investment in tangible goods is based on Gross investment in land (15 12 0) + Gross investment in existing buildings and structures (15 13 0) + Gross investment in construction and alteration of buildings (15 14 0) + Gross investment in machinery and equipment (15 15 0). (Structural Business Statistics (SBS) Code 15 11 0, Commission Regulation (EC) No 2700/98).

Sales of tangible goods includes the value of existing tangible capital goods, sold to third parties. Sales of tangible capital goods are valued at the price actually received (excluding VAT), and not at book value, after deducting any costs of ownership transfer incurred by the seller. Value adjustments and disposals other than by sale are excluded. (Structural Business Statistics (SBS) Code 15 21 0. Commission Regulation (EC) No 2700/98).

Debt:

Financial assets created when creditors lend funds to debtors, either directly or through brokers, which are either evidenced by non-negotiable documents or not evidenced by documents.

Short-term loans: loans whose original maturity is normally one year or less, and in exceptional cases two years at the maximum, and loans repayable on demand.

Long-term loans: loans whose original maturity is normally more than one year, and in exceptional cases more than two years at the minimum.

“Debts” account for provisions and long- and short-term debt (STECF meeting SGECA 06-01).

Livestock (volume):

Volume of livestock purchased during the reference period. The variable for livestock volume should correspond to the variable for livestock cost.

Fish feed (volume):

Volume of feed purchased during the reference period. The variable for feed volume should correspond to the variable for feed cost.

Volume of sales:

The variable for production volume should correspond to the variable on turnover value. Conversion factors from numbers to tonnes should be stated in the national programme.

Number of persons employed (Total employment):

This indicator refers to the number of people employed (including full-time and part-time employees) (SGECA-09-03). It corresponds to the Number of people employed of the Structural Business Statistics.

The number of persons employed is defined as the total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams). It includes persons absent for a short period (e.g. sick leave, paid leave or special leave), and also persons on strike, but not those absent for an indefinite period. It also includes part-time workers who are regarded as such under the laws of the country concerned and who are on the pay-roll, as well as seasonal workers, apprentices and home workers on the pay-roll. The number of persons employed excludes manpower supplied to the unit by other enterprises, persons carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises, as well as those on compulsory military service. Unpaid family workers refer to persons who live with the proprietor of the unit and work regularly for the unit, but do not have a contract of service and do not receive a fixed sum for the work they perform. This is limited to those persons who are not included on the payroll of another unit as their principal occupation. (Structural Business Statistics (SBS) Code 16 11 0, Commission Regulation (EC) No 2700/98).

The number of employees should be reported by gender.

FTE National:

“FTE national” refers to the number of full time equivalents (methodologies to calculate one FTE varies between the countries) (SGECA-09-03).

It corresponds to the “Number of employees in full time equivalent units” of the Structural Business Statistics.

The number of employees converted into full time equivalents (FTE). Figures for the number of persons working less than the standard working time of a full-year full-time worker, should be converted into full

time equivalents, with regard to the working time of a full-time full-year employee in the unit. Included in this category are people working less than a standard working day, less than the standard number of working days in the week, or less than the standard number of weeks/months in the year. The conversion should be carried out on the basis of the number of hours, days, weeks or months worked. (Structural Business Statistics (SBS) Code 16 14 0, Commission Regulation (EC) No 2700/98).

Reporting the number of FTE national by gender is optional.

Number of enterprises:

The "Number of enterprises" parameter corresponds to a count of the number of enterprises active during at least a part of the reference period (SGECA-09-03).

A count of the number of enterprises registered to the population concerned in the business register corrected for errors, in particular frame errors. Dormant units are excluded. This statistic should include all units active during at least part of the reference period. (Structural Business Statistics (SBS) Code 11 11 0, Commission Regulation (EC) No 2700/98).

Both definitions are similar. However, there are often some divergences with Eurostat data. This is mostly due to the use of the Veterinary list (which is necessary to trade with food products) to update the business register and so companies that are dormant or focusing on other products have been excluded.

Moreover, under the DCF regulation, the number of companies should be disaggregated by the number of persons employed (in ≤5; 6-10 and >10 FTE) (Structural Business Statistics (SBS) Code 16 14 0, Commission Regulation (EC) No 2700/98).

6.1.2 *Indicators calculated*

Mean wage or Average salary:

The average salary or mean wage estimates the salary an employee working full time is receiving on this sector. It includes the salaries themselves and the social security costs.

Mean wage = (Wages and salaries + Imputed value of unpaid labour) / FTE

Gross Value Added (GVA):

Gross Value Added measures the contribution of the sector to the economy.

The Gross Value Added indicator calculated in this report is similar, but does not fully correspond to the Value added at factor cost of the Structural Business Statistics.

Value added at factor cost as defined in the Structural Business Statistics is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. It can be calculated from turnover, plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production. Alternatively it can be calculated from gross operating surplus by adding personnel costs. Income and expenditure classified as financial or extra-ordinary

in company accounts is excluded from value added. Value added at factor costs is calculated "gross" as value adjustments (such as depreciation) are not subtracted. (Structural Business Statistics (SBS) Code 12 15 0, Commission Regulation (EC) No 2700/98).

Thus, Gross Value Added is calculated on this report as:

GVA = Turnover + Other Income – Energy costs – Livestock costs – Feed costs - Repair and maintenance - Other Operational costs.

Earnings Before Interest and Tax (EBIT):

"Earnings before interest and taxes (EBIT)" or "Operating profit" is a measure of a firm's profitability that excludes interest and income tax expenses.

EBIT = Turnover + Other Income + Subsidies – Energy costs – Wages and salaries - Imputed value of unpaid labour - Livestock costs – Feed costs – Repair and maintenance – Other Operational costs – Depreciation of capital.

Return on Investment (ROI):

Return on investment is a performance measure to evaluate the profitability (efficiency) of an investment.

During the SGECA-10-04 meeting it was decided that it was more appropriate to calculate the Return on Investment using the "Earnings Before Interest and Tax (EBIT)", rather than the Net profit.

ROI = EBIT / Total Value of Assets

Running Cost to Turnover Ratio (in %):

This indicator shows how much of the turnover (income) is consumed by production costs.

Running cost to turnover ratio = (Energy costs + Wages and salaries + Livestock costs + Feed costs + Repair and maintenance + Other Operational costs) x 100 / Turnover

Earnings Before Interest and Tax (EBIT) to turnover ratio (in %):

"Earnings before interest and taxes (EBIT) to turnover ratio" measures the margin of the companies.

EBIT to turnover ratio = (EBIT / Turnover) x 100

Labour productivity (by FTE or Employee):

Labour productivity is calculated as the average output per worker or per time unit. For the data collected under the DCF this can be calculated as Gross Value Added (GVA) divided by Full Time Equivalents (FTE). This indicator describes the value added to the economy from the activity, in this case the value added to the economy by one FTE.

$$\textit{Labour productivity} = \frac{GVA}{FTE}$$

When a MS cannot report the level of employment in FTEs, the number of employees is used as a second best alternative. However, this alternative compromises the comparison and should be clearly stated in the report.

Capital productivity:

Capital productivity is calculated as the average output per unit of capital. For the data collected under the DCF this can be calculated as Gross Value Added (GVA) divided by Capital value (total value of assets). The indicator describes the value added to the economy by one unit of capital.

$$\textit{Capital productivity} = \frac{GVA}{Capital\_value}$$

Future Expectations of the Industry indicator:

The indicator "Future Expectations of the Industry", developed by the EWG 11-03 from an initial idea of Michael Ebeling, could be interpreted as a proxy for the industry's wish to remain in the market in the medium/long term. If investment minus depreciation is positive, it has the meaning that the sector is allocating resources to increase its production capacity, and therefore it expects to remain in the market to recover the cost of the investment. If investment minus depreciation is close to zero, it could be interpreted as an indicator that the sector is only wishing to maintain its production capacity in the future, and that it is not planning to expand. The third case is where the sector is not even covering its depreciation costs, thus disinvesting with the possible intention to reduce its presence in the market in the future. Therefore, this indicator would be used to approximate the industry's investing behaviour in the future and it has been considered useful by the experts.

$$FEI = \frac{(Net\_investments - Depreciation)}{Capital\_value}$$

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8 APPENDICES

8.1 Segment codes

Code	Segment name	Main species	Environment
seg1_1	Salmon Hatcheries & nurseries	Salmon	Finfish salt water
seg1_2	Salmon on growing	Salmon	Finfish salt water
seg1_3	Salmon combined	Salmon	Finfish salt water
seg1_4	Salmon cages	Salmon	Finfish salt water
seg2_1	Trout Hatcheries & nurseries	Trout	Finfish fresh water
seg2_2	Trout on growing	Trout	Finfish fresh water
seg2_3	Trout combined	Trout	Finfish fresh water
seg2_4	Trout cages	Trout	Finfish fresh water
seg3_1	Sea bass & Sea bream Hatcheries & nurseries	Sea bass & Sea bream	Finfish salt water
seg3_2	Sea bass & Sea bream on growing	Sea bass & Sea bream	Finfish salt water
seg3_3	Sea bass & Sea bream combined	Sea bass & Sea bream	Finfish salt water
seg3_4	Sea bass & Sea bream cages	Sea bass & Sea bream	Finfish salt water
seg4_1	Carp Hatcheries & nurseries	Carp	Finfish fresh water
seg4_2	Carp on growing	Carp	Finfish fresh water
seg4_3	Carp combined	Carp	Finfish fresh water
seg4_4	Carp cages	Carp	Finfish fresh water
seg5_1	Other freshwater fish Hatcheries & nurseries	Other freshwater	Finfish fresh water
seg5_2	Other freshwater fish on growing	Other freshwater	Finfish fresh water
seg5_3	Other freshwater fish combined	Other freshwater	Finfish fresh water
seg5_4	Other freshwater fish cages	Other freshwater	Finfish fresh water
seg6_1	Other marine fish Hatcheries & nurseries	Other marine fish	Finfish salt water
seg6_2	Other marine fish on growing	Other marine fish	Finfish salt water
seg6_3	Other marine fish combined	Other marine fish	Finfish salt water
seg6_4	Other marine fish cages	Other marine fish	Finfish salt water
seg7_1	Mussel rafts	Mussel	Shellfish
seg7_2	Mussel Long line	Mussel	Shellfish
seg7_3	Mussel Bottom	Mussel	Shellfish
seg7_4	Mussel Other	Mussel	Shellfish
seg8_1	Oyster rafts	Oyster	Shellfish
seg8_2	Oyster Long line	Oyster	Shellfish
seg8_3	Oyster Bottom	Oyster	Shellfish
seg8_4	Oyster Other	Oyster	Shellfish
seg9_1	Clam rafts	Clam	Shellfish
seg9_2	Clam Long line	Clam	Shellfish
seg9_3	Clam Bottom	Clam	Shellfish
seg9_4	Clam Other	Clam	Shellfish
seg10_1	Other shellfish rafts	Other shellfish	Shellfish
seg10_2	Other shellfish Long line	Other shellfish	Shellfish
seg10_3	Other shellfish Bottom	Other shellfish	Shellfish
seg10_4	Other shellfish Other	Other shellfish	Shellfish

8.2 TOR 2: Evaluate European Aquaculture Performance Indicators (EAPI)

In support of DG MARE, JRC developed European Aquaculture Performance Indicators (EAPI) (Hofherr *et al.*, 2012), identifying the relative starting positions and different circumstances in the Member States. The EAPI are based on statistical data and data from the aquaculture data call. The chosen performance indicators could also serve as a tool to make the results of the policy cooperation measurable.

The EWG is requested to comment on the proposed EAPI. In particular, they are invited to provide for their relevant national chapter of the EAPI documents a reply to the following questions:

Do the data are consistent with the national aquaculture situation?

If not, what data are not consistent and what would be the correct data?

Does the national chapter of the EAPI report give a fairly correct picture of the national aquaculture situation?

If not, what part and why does it not sufficiently reflect the national situation?

Background

One of the aims of the new Common Fisheries Policy is to ensure the development of aquaculture - taking into consideration the necessary promotion of sustainability as well as the contribution that aquaculture can provide to food security and employment. As foreseen in the Common Fisheries Policy reform, the Commission proposes to promote aquaculture through an open method of coordination. An open method of coordination is a voluntary process for political cooperation based on strategic guidelines, multiannual national plans, agreeing on common priorities and targets.

The EU strategic guidelines will represent the basis for the development of Multiannual Strategic Programs at national level, aimed to improve the industry competitiveness as well as other elements of the sector (employment, economy, quality of local life, access to waters, etc.). The guidelines should take also into account of the relative starting positions and different circumstances in Member States.

On request of DG MARE, the Joint Research Centre (JRC) has developed a set of indicators which are aimed to identify the starting positions and different circumstances in the Member States. The study explores 3 main aquaculture dimensions (economic, social, environmental) for a set of 12 indicator (Growth, Gross value added, Profitability, Labour productivity, Trade balance, Diversification, Employment, Apparent consumption, Fishmeal/Fish oil use, Nitrogen and Phosphorus Emission). The original intention was also to include governance indicators in the study, but the lack of relevant data as well as the stagnation in the farm licensing system suggests to differently consider the mentioned indicators.

The outcome of the study can have a double benefit: a) to provide the Member States with an instrument to draft the multiannual national strategic program - as established by the new CFP; and b) to help the Member States to progressively monitor the achievement of the goals foreseen in their national strategic program.

As the study will be delivered to DG MARE soon, STECF experts are asked to review the study.

EWG comments

The experts from the EWG welcomed the JRC presentation and the European Aquaculture Performance Indicators. The EWG considers that it is a good idea to use such indicators to obtain a quick vision of the EU aquaculture sector. These indicators could be complemented with the analysis of this EWG performed in the STECF report.

The EWG has considered the draft report as well as the methodology and the data/graphs which form the basis of the study. Based on this, experts have formulated their opinion in terms of consistency of the

pictured scenario in each country, robustness of the methodology, and finally possible suggestions of additional indicators in future.

The EWG made the following points in response to the presentation on Indicators:

Growth ought to include both volume and value because of the importance of changes and the difficulty of comparing volumes alone of different species. The use of money as a common measure is useful in overcoming this problem.

The EWG wonders if the methodology could be improved to allow for small, especially family, production units. The EWG considers that the current methodology leads the results to be biased towards large producers. Data from the present DCF on the production from small enterprises may contribute to improve the quality of the exercise.

The EWG wonders if the uses of fishmeal and fish oil indicators are appropriate indicator. The EWG notes that the use of fishmeal and fish oil does not imply an economic cost. As foreseen in the new Common Fishery Policy, environmental indicators have to be taken into consideration in the development of the Multiannual Strategic Programs of the EU member states. However, the EWG are economic experts, and environmental issues should be analysed in more detail by more appropriate experts.

The diversity index used is the conjugate of the Herfindahl-Hirschman Index (HHI), not directly the HHI, as stated. This raises the implications that may be derived from seemingly bald statistics in that diversity in the industry structure may or may not be economically desirable. Indeed, some of the most successful cases have taken place in aquaculture sector with a very limited or null diversification. Besides, the diversification of the industry is currently a political target in the new CFP. It should be noted that this indicator itself does not give any preference for diversification, but it is just a good measure of the level of diversification based on produced species. Attention should be given in making clear the distinction between the measurement (the indicators are aimed to provide measurement and not assessment) and the evaluation that administrators/politicians could do of it.

On this sense, attention should be exercised when presenting the results. It was implied that the presentation of the results in the report is intended to be neutral. However, sometimes graphics have an implicit message which may (or may not) be misleading, unless each set of indicators is provided with a caveat to ensure that misinterpretations are prevented. The method of normalisation using the quartiles is obscure. There is a general consensus on the responsibility of the policy-makers to decide their national target.

The radar charts (alternative name, spider's web diagrams) are not good for showing growth. In fact, the growth indicator is derived from a growth rate and therefore is the only one built on a temporal time series rather than fixed point in time. It is represented for consistency on the same chart with the other indicators, but time series are provided in the annex. The overall size of a sector is not shown because there is no weighting (this is done to compare across segments and countries, but contextual data is provided in the annexes to give an appreciation of size). Normalisation has potential problems according to the starting date chosen and the absence of weighting. JRC will look at other ways to measure growth trying to incorporate weighting on size and reference to same starting date. Estimates depend in some cases heavily on the reliability of the regressions which appear to depend on very limited time series. This aspect can be addressed with the availability of further data, and current this limitation should be better described.

The report authors emphasized that their analysis did not imply which direction of each indicator was to be viewed as good or bad: that is a policy decision. However, advice on the use of radar charts (http://www.math.yorku.ca/SCS/sugi/sugi16-paper.html#H1_5:Star) is that all scales should run in the same sense, so every plotted variable shows "more" as equivalent (either better or worse). The charts as shown show the eight variables equally spaced by angles, with colour coding to group the economic, social and environmental variables. Use of red/green/blue is not optimal (consider colour-blindness). Such charts

do not code information in the directions, so the format could be adapted to have larger angles between groups of variables: if the software has no other method, try inserting dummy variables with zero values. Radar charts are suggested as a visual tool for multivariate comparisons, so are best arranged in arrays of "small multiples" (Tufte's term), which might be in a "trellis display" (Cleveland's term), arranged in pairs with their national "target" patterns (as determined by policy), or overlaid on a country map to aid identification.

Radar plots have some history (i.e. Florence Nightingale's bat-wings:http://www.york.ac.uk/depts/maths/histstat/small.htm) and have visual impact, but have the complexity of lines at arbitrary angles. An alternative would be parallel coordinates (profile plot), which also makes it easier to adjust the spacing between axes so that variables are grouped and allows actual and target values to be plotted on one axis. You could even join them and code the sense of the variance in colour.

The normalization of plotting as described maps the inter-quartile range (over the countries within each year) onto [0,1] as radii. It seems undesirable to show non-zero values as zero and may cause confusion of which variable is which. Each radius should therefore have a small but non zero length to indicate minimum values, the low value to be determined pragmatically. As a further comment on the normalization, the proposed method is linear (X-min)/max. It would be worth looking at the distributions of values from the countries and considering alternatives such as rank (non-parametric) or z-value (Inverse Normal of CDF).

JRC feed-back

The Joint Research Centre has welcomed and appreciated the technical contribution and advice of the EWG experts. All comments will be taken into serious consideration and the report will be amended accordingly. The JRC exercise was following the basic criteria foreseen in the draft Common Fishery Policy and was based on the latest available data for aquaculture. However, as soon as new data will be made available this will justify the review of the calculations and a more updated picture.

JRC fully shares the view of the EWG experts to prevent misinterpretation of the results of the study by an accurate explanation of indicators and results to the policy makers. JRC is confident that the open method of coordination in place will ensure that - in collaboration with DG MARE as well as with the responsible authorities of the Member States - the results can be unambiguously communicated.

8.3 Additional TOR: Review of the TORs of the DCF Workshop on aquaculture

A DCF workshop on aquaculture will be organized from the 5th to the 8th of November by the Portuguese Ministry of Agriculture and Sea, General Directorate for Maritime Resources and will be chaired by Leonor Elias.

Even the review of the TORs for the DCF workshop on aquaculture is not part of the TORs of this working group, the EWG 12-13 decided to review the TORs of the workshop following the recommendation made in several STECF meetings.

Background

The STECF report on the Review of Proposed DCF 2014-2020 – Part 1 (STECF-12-07) and the STECF report on the Evaluation of MS Annual Reports for 2011 of the DCF (STECF - OWP-12-05) both dealt with issues affecting data collection for the aquaculture sector.

The STECF - OWP-12-05 recommended: “That the AR guidelines and the AR evaluation templates are updated taking into account the proposals indicated in Chapter 10 of the EWG 12-08 Report”. STECF proposes that this may best be achieved by adding this to the TOR of EWG 12-20 and EWG 12-13 (for aquaculture), and then STECF will adopt it by written procedure together with the response on the amendments of the NP in order that the update can be finished early in 2013. For this work the remarks and suggestion in chapter 10 of the EWG 12-08 report should be taken into account. The update should also take into account the amendment of some methodological issues as proposed in chapter 10 of EWG 12-08 report.

Besides, the EWG 12-01 recommended: “Adding questions on future DCF needs and possible changes of the current aquaculture segmentation to the TORs of both STECF EWG 12-13 on economics of aquaculture and DCF WG on aquaculture which is proposed by STECF EWG 11-18 and should meet in 2012”.

In the first week of October the DCF revision meeting part 2 will take place. In order to address the needs of aquaculture data collection properly, proposals for changes, i.e. skipping or adding variables, are very welcome. Further, a look at the already proposed issues on aquaculture data collection in the reports mentioned may be undertaken.

At last, a Glossary is recommended to be produce for all parts of DCF: “STECF concludes that to ensure a common understanding of the terms of the DCF, a glossary with clear definitions should be produced. STECF therefore reiterates its previous recommendation from PLEN 11-03.” (see report STECF-12-07). At the Liaison meeting this week it was also discuss to have the work for the Glossary at least partly be done at the Workshop on Aquaculture.

TORs on the aquaculture workshop

The Terms of Reference for the DCF aquaculture workshop have already been drafted by Planning Group on Economic Issues (PGECON) on March 2012, from the revision of EWG 11-18 proposal.

Present and discuss MS experiences in DCF for aquaculture sector: main critical aspects

Adoption, if possible, the methodology for estimation of unpaid labour according peculiarity of main European segments

Propose best practices to be followed by MS in estimating FTE

Integration of the Glossary of Economic Terms

Future DCF 2014-2020: suggest appropriate segmentation for the collection of economic data and review the list of variables required by the current DCF

EWG 12-13 comments

TOR nº. 1: MS experiences in DCF aquaculture sector: main critical aspects

The Group considered that this is a very important point, because it allows MS to highlight their problems and critical points, in order to identify possible solutions.

TOR nº2: Adoption, if possible, the methodology for estimation of unpaid labour according peculiarity of main European segments

The Group considers that there are no uncertainties on the unpaid labour estimation. However, the estimation of imputed value of unpaid labour is more problematic. Nevertheless, the estimation of the imputed value of unpaid labour was discussed on the DCF Workshop “Workshop on calculating capital value

using PIM and definition of DCF variables" hold in Naples from the 13th to the 17th of June 2011. Perhaps what is necessary is to provide guidelines on its estimation.

The Group also wonders whether the DCF workshop has the capacity to adopt methodologies, or it should be done by another body, following maybe the workshop recommendations.

TOR nº.3: Propose best practices to be followed by MS in estimating FTE

On the previously cited DCF Workshop hold in Naples this indicator was already discussed and a common understanding was achieved. So we recommend to follow the recommendations from the workshop.

TOR nº.4: Integration of the Glossary of Economic Terms

The Group agrees that the definition laid down in the Structural Business Statistics (SBS) should be used as guidance. Besides, the reports done by this Group (EWG 12-13 and EWG 11-14) provide a glossary based on the SBS. In this situation, further work should be done to harmonize with the outcomes of other meetings. Also, whenever it is possible, harmonization between fisheries, aquaculture and processing industry terms should be performed. However, one should be aware that not always similar terms are employed with the same meaning on the different reports.

TOR nº.5: Future DCF 2014-2020: suggest appropriate segmentation for the collection of economic data and review the list of variables required by the current DCF

This point of the TORs has been divided in two different subsections.

5.1) suggest appropriate segmentation for the collection of economic data

DCF uses a different segmentation that the one used by EUROSTAT.

EUROSTAT recently started to collect data for aquaculture (Reg. No 762/2008 of 9 July 2008 on the submission by Member States of statistics on aquaculture). Some indicators as value of production (by specie), structure of the sector (capacity), input to capture-based aquaculture (volume and value) are collected by EUROSTAT. The data in both sources are segmented by technique, but the techniques in EUROSTAT segmentation are more disaggregated (precise) than in the DCF. Indeed, specific inland based techniques are not specified in DCF, probably because the collection of freshwater aquaculture is not obligatory in the DCF. The possibility to report the inland water aquaculture in ponds, tanks and raceways, enclosures and pens and recirculation systems should be assessed.

However, the potential costs of increasing the disaggregation level on the segmentation should be evaluated as well. One of the main problems to be considered is the loss of data reported due to confidentially issues.

5.2) review the list of variables required by the current DCF

The EWG is aware that some of the current variables may be difficult to obtain (estimate), especially the financial variables. Indeed, it can be problematic for some segments (i.e. Clam and Oyster Bottom Culture) to estimate debt, depreciation of capital, net investments, etc. This takes place because for those segments, most of the units are family units, where those variables are difficult to separate from other activities of the family unit.

On the other hand, proposals to use “Interest payment on foreign debt”, maybe with sum of balance sheet also raised. Then equity could be easily be calculated by subtraction. But there may be difficulties to obtain the information for all segments, and there would be also the need to collect the interests received to calculate profitability.

Currently, it is asked for debts and assets, but no monetary assets on bank accounts, so no balance sheet sum is currently available and therefore no precise equity sum can be calculated, but an estimation of the financial position. Especially for those segments initially mentioned, to obtain the monetary assets on bank accounts may be even more difficult.

Here, the DCF needs to consider the trade-off between having some variables that can give a view of the financial situation of the segments (i.e. importance of the indebtedness level when assessing the profitability and future capacities of the sector), an adequate calculation of the profitability, homogeneity of data requirements (and consequently on indicators calculated) among segments, data robustness and the feasibility and costs to obtain the data.

Other variables that can be modified or introduced are:

- Combine “repair and maintenance” together with “other variable cost” in one variable;
- Include “Livestock in weight and value of stocks” (stock at the end of the period) in order to know the stock variations
- Subsidies for investments. Because it is the main subsidies item and important to track and evaluate the EFF, among other sources. Currently it is only asked for direct subsidies.
- Consider to report the sales (production) number of individuals (apart from currently reporting their weight and value). This makes sense for some segments, especially hatcheries and nurseries), since weight can change significantly in a short period.
- It could be interesting to have some indicator of the significance of the national production on the national consumption. However, there would be the need to collect other type of data that what it is currently reported under the DCF. Therefore, another indicator could be the concentration on the segment, estimated by the Herfindahl-Hirschman Index of the productions.
- Another issue that was raised is the possibility to have in the future DCF, an overview every 3 years of the spatial distribution of the sector. This shall be done by using existing data on the fisheries, processing and aquaculture sector. The spatial distribution/concentration of enterprises in the sector, if possible including employment and turnover, if accessible, may be reported on a 3-year period on a regional level, which still has to be defined.

TOR 6: Possible future extensions of the current obligations on data collection for aquaculture under the DCF, in terms of costs and possibility of collected the data

In addition the Group briefly discussed the request from the Commission to investigate on the DCF Workshop the possible future extensions of the current obligations on data collection for aquaculture under the DCF, in terms of costs and possibility of collected the data. The EWG wonders whether the European Union has any power on the inland aquaculture or it is fully under the MS sovereignty. In order to alleviate the pressure on the costs, the possibility to use more economic sampling/enquiring tools was pointed (i.e.

online questionnaires for inland water aquaculture). It is expected that in the DCF Workshop in Lisbon it is going to be possible to have a more consolidated opinion on that.

As a final comment it is important to highlight that the need for more information should take into consideration that it is affordable, reliable, meaningful and useful, based on policy and costs of collecting the data should not exceed the benefit.

8.4 Coverage

Data on the EU aquaculture sector was requested under the Data Collection Framework (DCF) (cf. Council regulation, European Commission (EC) No 199/2008 of 25th February 2008) for the years 2008-2010.The call for data was issued by DG MARE on the 21 May 2012. Member States were requested to submit the data within 1 month of the call, making the submission deadline the 21 June 2012.

All EU Member States are required to collect and provide data on salt water aquaculture, while the collection of data on fresh water aquaculture is not compulsory. The Data Collection Framework (DCF) requires data quality assurance by Member States. Data checks were performed by the JRC and by experts attending the meeting to elaborate this report. This lead to data resubmissions after the deadline and even after the EWG meeting.

This was the second call for aquaculture data from Member States. Although there was some improvement in the quality of the data submitted compared to the previous call, there are still many issues with several parameters that Member States are working to improve. Data coverage remained similar to the previous data call. The main data coverage issues in the report are summarised in the following points:

- Under the DCF, the submission of marine aquaculture data is compulsory; while the submission of inland freshwater aquaculture data is voluntary. Therefore, aquaculture data is not requested from the EU landlocked countries (Austria, Czech Republic, Hungary, Luxemburg and Slovakia). According to FAO and Eurostat figures, aquaculture production in these Member States was less than 3 % of the total EU aquaculture production in 2010.
- Aquaculture production in Latvia and Lithuania is based on freshwater species that are not mandatory and, hence these MS do not carry out a data collection system for the aquaculture sector. Nonetheless, the production of these countries is minor at the European level (less than 0.5 % of the EU total aquaculture production in 2010).
- Belgium and Greece did not provide any data in this data call. While, Greece did not respond to the data call, Belgium sent a note stating that the response rate of their survey was too low to be able to estimate the economic parameters required. Indeed, the low number of salt water aquaculture companies in Belgium leads easily to confidentiality issues. While, the Belgian aquaculture production is almost negligible (less than 0.1 % of the EU total production), Greek aquaculture production is rather significant, representing 9 % in weight and 12 % in value of the EU aquaculture production.
- The Netherlands only provided data for 2008 and 2009. Missing 2010 Dutch aquaculture data represents 5 % in weight and 3 % in value of the EU aquaculture production.
- Germany, Poland and Slovenia only reported the mandatory marine aquaculture data. Hence, the unreported freshwater aquaculture production from these Member States accounted for 5 % of the EU aquaculture production in 2010.
- Even if Italy provided aquaculture data for the 3 years, the data reported refers to a sample of the total Italian aquaculture production, and consequently this data cannot be used in this exercise. Italian aquaculture production is also significant, since it represents 12 % in weight and 11 % in value of the total EU aquaculture production.

- The United Kingdom failed to provide detailed cost structure data. UK aquaculture data represents 16 % in weight and 19 % in value of the total EU aquaculture production.
- Moreover, Poland and Romania provided data for 2009 and 2010, but not for 2008. France provided a full set of economic variables only for 2010.

Therefore, EU aquaculture production and turnover for EU 27 (including landlocked countries) have been fully estimated (100 % coverage) by including FAO data to fill the missing parameters in this report. General national information (i.e. number of companies, employees) is available for two thirds of the total EU production. The necessary data to fully estimate the economic performance at the national, as well as at segment level, have been provided for slightly more than half of the EU aquaculture production.

Compared to the previous data call, availability of general national information has decreased from three quarters to two thirds, while data available to perform the full economic analysis increased from two fifths to half the EU aquaculture production.

Finally, it should be stated that quality of some of the data reported raises some concerns. We hope that together with data coverage, data quality will also be improved in the next data calls.

8.5 Data

The data used to compile this report will be provided at the following address:

http://stecf.jrc.ec.europa.eu/data-reports

8.6 List of Participants

1 - Information on STECF members and invited experts' affiliations is displayed for information only. In some instances the details given below for STECF members may differ from that provided in Commission COMMISSION DECISION of 27 October 2010 on the appointment of members of the STECF (2010/C 292/04) as some members' employment details may have changed or have been subject to organisational changes in their main place of employment. In any case, as outlined in Article 13 of the Commission Decision (2005/629/EU and 2010/74/EU) on STECF, Members of the STECF, invited experts, and JRC experts shall act independently of Member States or stakeholders. In the context of the STECF work, the committee members and other experts do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members and invited experts make declarations of commitment (yearly for STECF members) to act independently in the public interest of the European Union. STECF members and experts also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information:

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European Commission

EUR 25975 EN – Joint Research Centre – Institute for the Protection and Security of the Citizen
Title: Scientific, Technical and Economic Committee for Fisheries. The Economic Performance of the Aquaculture Sector – 2012 exercise (STECF-13-03).

EWG-12-13 members: Guillen, J., Avdelas, L., Avdic-Mravlje, E., Bartelings, H., Bjorndal, T., Borges Marques, A. C., Carvalho, N., Contini, F., Dennis, J., Ebeling, M., Elias, L., Fernandez Polanco, J. M., Fiore, G., Hofherr, J., Le Bihan, V., Lees, J., Motova, A., Natale, F., Nielsen, R., Nilsson, P., Pienkowska, B., Reese, A., Rodgers, P., Sainz de la Torre, A., Stroie, C., Tikakoski, S., Urumov, S., and Virtanen, J.

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Luxembourg: Publications Office of the European Union
2013 – 237 pp. – 21 x 29.7 cm
EUR – Scientific and Technical Research series – ISSN 1831-9424 (online), ISSN 1018-5593 (print)

ISBN 978-92-79-29909-4

doi:10.2788/90296

Abstract

This report, on the Economic Performance of the European Union (EU) Aquaculture sector, is the second report of this type produced for the sector. It provides a comprehensive overview of the latest information available on the structure, social, economic and competitive performance of the aquaculture sector at both national and EU level. The data used in this publication was collected under the Data Collection Framework (DCF). In 2010, the aquaculture sector production in the EU-27 accounted for 1.36 million tonnes, with an estimated turnover of 3.58 billion Euros. In the EU there are about 15,000 companies, whose main activity is the aquaculture production, producing a Gross Value Added of about 1.5 billion Euros. Available data confirms the profitability improvement in 2010, after two years of suffering losses. Profitability based on the Return On Investment calculated from the EBIT was 5.7 %. The EU aquaculture sector gave direct employment to more than 85,000 people in Europe, with an annual average wage of around 19,400 Euro. Women accounted for 29 % of these jobs. The large percentage of part-time work in the sector should be highlighted, as can be seen through comparison of the total employment numbers with employment expressed in Full Time Equivalents (FTE is 47 % of the total number of employees). Part-time employment is important in the shellfish and freshwater aquaculture subsectors. The economic performance and the productivity differ enormously by subsector and segment. The cost structures of the different subsectors (i.e. shellfish, marine and freshwater aquaculture) are also analysed on the report.

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LB-NA-25975-EN-N

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

Publications Office

ISBN 978-92-79-29909-4

9 789279 299094